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EIGHTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

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IN ASSEMBLY,

FEBRUARY 27, 1888.

EIGHTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH.

STATE OF NEW YORK:

EXECUTIVE CHAMBER,
February 27, 1888.

To the Legislature:

I have the honor to transmit herewith, the annual report of the State Commissioners of Health for 1887, with appendix.

DAVID B. HILL.

26776

STATE BOARD OF HEALTH OF NEW YORK.

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STATE SUPERINTENDENT OF REGISTRATION AND VITAL STATISTICS.

DR. LEWIS BALCH,	*As Secretary of the Board.*

THE PROPERTY OF THE N. YORK HOSPITAL.

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REPORT.

ALBANY, *February* 8, 1888.

To his Excellency DAVID B. HILL,
Governor of the State of New York:

SIR. — The Eighth Annual Report of the State Board of Health, which is here presented, shows the work of the Board during the year 1887. In its prosecution there has been an adherence to the old lines of public service early mapped out as experimental, but persistently followed year after year, till at length demonstrated as the most prudent. Working through the local organizations established by law, preserving their autonomy and independence, settling their disputes, supplementing their deficiencies, and endeavoring to elevate the plane of their public usefulness, have occupied much of the Board's time during the past twelve months, and after an experience of nearly eight years in witnessing the formation of these sanitary centers all over the State, in watching their development, and in co-operating with them in their work, it is satisfied that the foundations of the State sanitary service have been carefully and well laid, and that future effort may wisely be directed towards raising the superstructure on these tried and safe foundations.

A central head at the Capitol, with all these organizations in connection with it, is so in keeping with the genius of our government, and so far-reaching in its sphere of activity as to be hardly susceptible of structural improvement.

It was not so much the want of knowledge that the State Board found on entering upon its field of duty, as the lack of organized bodies through which this knowledge could be authoritatively applied for the benefit of the people. This need has been at length met in the establishment of local Boards by early laws, and in the more definite statement of their powers and duties by chapter 270 of 1885.

The various aspects of the State Board's work for the past year will now be reviewed.

DRAINAGE AND SEWERAGE.

For details of the work in this direction reference is made to the proper section in the appendix. It is encouraging to note a steady growth in public appreciation of the value of these sanitary necessities, though much labor is still required to press home the doctrine upon the unthinking. The report of the condition of the village of Tivoli, exhibits doubtless the wretched condition of many of our country villages, having no provision for sewerage and only the rudest for drainage, with a defiled water supply, and a few of the more thoughtful, constituting the principal tax payers, anxious for sanitary appliances, out-voted in numbers by those less interested financially and caring for none of these things. The report, made at the instance of the Board of Health of the village, reviews very carefully the wants of the village and proposes means for remedying the defects, including the building of a sewer. A thorough system of subsoil or under-draining for the whole village is likewise recommended both as a sanitary improvement and also as enhancing the productiveness of that heavy soil for garden purposes.

The report on the condition of the abandoned Chemung canal in the town of Elmira calls attention to the importance of abating admitted nuisances in such a manner as not to occasion others. A railroad, by constructing a line along the general direction of the canal, crossed its prism several times and thereby created several pools filled with stagnant water. These pools the town Board of Health condemned as a menace to the public health, and ordered the railroad to abate. The railroad paying no attention to the order was subsequently indicted by the grand jury, and on the case coming to trial convicted of maintaining a nuisance detrimental to the public health. Sentence was suspended to allow the railroad an opportunity to abate the nuisance. The latter on attempting to fill up the pools was threatened with an injunction by a gentleman whose lands he claimed would be flooded thereby. In this emergency the town Board of Health sought the advice of the State Board and an expert was assigned for the work. By a scientific handling of the question, he satisfied all parties that the filling up of the pools was the proper course to pursue to abate the nuisance, and with a few additional suggestions all parties seemed satisfied. The total cost of the work was estimated at $2,500. The report will be found worthy of thoughtful perusal, illustrating as it does, the economic as well as sanitary value of skilled counsel in matters pertaining to the public health.

The report on an inspection of Port Chester village brings to light one great evil of the past with which local boards are at present grappling; viz.: the custom of constructing private drains without any reference to a general system applicable to the locality, without regard to outfall, injury to neighbor or vicious influence on the subsoil, air, or water. 'Tis true, as is often remarked, our fathers got on without modern improvements, and we are to-day suffering from their neglect. The villages, towns and some cities in the State find the difficulty of stamping out epidemic disease and of abating nuisances complained of enhanced ten-fold by reason of this neglect, which is boasted of by the ignorant and parsimonious as one of the great virtues of that primitive age.

The report on the pollution of Harbor Brook, Syracuse, was made for the guidance of the Board of Health of that city. Becoming alarmed at the consequences of a further pollution of the brook (which had already received the sewage of the State Idiot Asylum) by the construction of an additional sewer to discharge into it the sewage of a large section of the city in that neighborhood, the Board of Health obtained an injunction preventing the city from building such sewer on sanitary grounds. The report fully sustains the position taken by the City Board of Health and points out the way of meeting the needs of the city and asylum without further pollution of this natural water course. The plan of converting the brook into a covered sewer is emphatically condemned, as it should be, although this has been a practice commonly followed where proper sanitary engineering knowledge is lacking, and which has always been an obstacle to sanitary improvement and a source of increased expense afterwards.

SANITARY INVESTIGATIONS.

The question of the safety of building a school-house on the site of what was formerly used as a cemetery at Port Jervis came again under the consideration of the Board during the past year. It had in 1884 been investigated by Dr. Alfred L. Carroll, then Secretary of this Board, and reported upon adversely, on the ground that the cemetery contained too many interred bodies. Since that time, however, measures have been taken to render the location acceptable by exhuming the bodies, and resorting to other expedients to improve its sanitary condition, and this Board was again asked for its judgment in the matter. The report of the expert sent sets forth at length the efforts made to render the site sanitarily safe, the methods of exhumation adopted, and the condition of the bodies exhumed. He arrived at the conclusion that from the sandy nature of the soil a period of nine years in common coffins sufficed for the complete destruction of all parts of the body except the bones, while the great majority of the bodies had been buried upwards of eighteen years. The work of exhuming had been thorough, every particle that could be distinguished from the soil. even to the dust and mould on the bottom of coffins, was scrupulously taken away and the excavated soil treated with a ton of copperas, which the following spring rains washed into the porous subsoil. All kinds of vegetation were allowed to grow upon the lot thereafter.

The main interest of the return of the expert will be found in the prominence given by him to the free passage of air through the interstices of the soil as a better and more rapid means of ridding it of its impurities than ordinary vegetation; and the further suggestions he makes for enhancing the sanitary security of the site are based upon this principle of soil ventilation. The expert remarks: "From the recent carefully conducted researches of Schlosing, Muntz, Wollny, Fleck and others, it has been found that in the resolution of complex organic matter when buried in earth or natural soil, a two-fold action or process takes place, the one being a relatively slow and purely chemical process, while the other is a relatively quick biological process, caused by the development of certain microbes whose exact nature is not yet definitely known. The rate at which decomposition occurs depends upon a number of factors, such as the composition of the soil, its permeability, the degree of moisture, temperature, etc.; but of all these, the most important in hastening decomposition is the free passage of air through the pores or interstices of the soil. Wollny also asserts that the intensity of the biological process is greatly accelerated when the surface of the ground is bare and free from ordinary vegetation. The depth below the surface at which these microbes are found also varies with the above named factors, it being generally considered that they occur in greatest number in the uppermost strata, although they are still abundant in well-drained soils ten feet below the surface. They also inhabit all kinds of soil, their number depending upon the amount of organic substances contained therein, in addition to the other conditions above mentioned; and their function appears to be the conversion of unstable nitrogenous compounds into permanent nitrates, and, to some extent also, the transformation of carbon compounds into carbonic acid and minute quantities of alcohol. It is, therefore, obvious that if the condition favorable to the growth and development of these minute organisms be introduced in a soil which is suspected of being contaminated by organic matter, as in the case of the exhumed and abandoned St. John's Cemetery, a substantial improvement will be sure to follow in case that any putrescible human remains have been left in the ground."

A contrivance for admitting pure air into the soil and providing for the escape of impure was devised in the report and recommended to the school authorities of Port Jervis as an additional precaution to guard against a danger that seemed to be reduced to the minimum.

Both reports of the Board on this cemetery have been consistent, though the one was adverse to its use as a school site and the other favorable, and the action has been such as to benefit Port Jervis by calling attention to a danger as in the first report, and thus securing the adoption of proper preventive measures, as the second report conclusively shows.

But cemeteries have not only been feared on account of their effects upon the air of houses in the vicinity, but also for their effects upon the sub-soil waters feeding the public wells. The most notable case coming under this Board's observation during the past year was that at Afton, where, great public apprehension being felt on the subject, the State Board was requested to investigate the situation and give suitable advice. The report of the expert will be read with interest. He found the soil to be of fine sandy loam for six feet on the surface, underneath which was a stratum of sand from five to seven feet thick, further down a thick deposit of coarse sand and gravel mixed with small boulders, under which was a bed of quick-sand of unknown depth, from which the water is derived. The graves were usually from five to five and a half feet deep, and did not in any case reach the sub-soil water. The soil was considered most favorable for rapid decomposition of bodies, from eight to ten years sufficing for reduction to a mere skeleton if inclosed in the ordinary wooden coffin. He found by microscopic examination of the water, and by Heisch's simple test for organic matter, evidence which, while not conclusive, was yet sufficient to cause a suspicion regarding the purity of the wells, particularly those in the line of the flow of the sub-soil waters under the cemetery.

Privies and barns were doubtless contributing their quota to the pollution. He recommended that the old cemetery be permanently abandoned or the adjacent wells closed, and pointed out that an adequate supply of good water could be secured at a comparatively small cost. In fact he urged both the closing of the cemetery and the procuring of a supply of water from a new source.

The mill-pond as a source of malarial disease has had many savage accusations during the past year. The Board was called to investigate two, one at Canastota, the other at Canaan. At Canastota, however, more was found contributing to the nuisance complained of than the mill-pond, although that was the chief offender. The pond was formed by a dam twenty feet high across the channel of Canastota creek, and situated in the most populous part of the village. When filled, its water surface covers an area of about three and a half acres, or, including the marshy saturated margins surrounding it, nearly five acres. The water privilege having existed for about seventy years, the bottom of the pond had become filled with large quantities of silt, rendering it very shallow; so shallow, indeed, that when the water level is reduced but two feet below the crest of the dam, the water surface behind the latter will be diminished to an aggregate area of not more than three-quarters of an acre. It is necessary to make a reduction to this extent while operating the mill in warm weather, owing to the insufficiency of a constant supply from the creek, and the water must be impounded before the operation of the mill can be resumed. Owing to this condition of things, the expert remarks that in summer the water power of the mill will be exhausted in a few hours, and a surface of from two and three-quarters to four and a quarter acres left exposed for from sixteen to twenty hours, the time taken to fill up the pond again. The exposed ground was also made the receptacle of the sewage and garbage from adjacent dwellings, and thus its noxious character during the period of exposure was all the greater. After discussing ably the effects of this on the health of the locality, the expert recommends:

First. Either the abandoning of the water privilege, removing the dam, deepening the creek's channel, where obstructed by silt, and properly draining the wet or swampy margins of the pond by lateral ditches, thereby reclaiming or making productive a large tract, or:

Second. The improvement of the pond itself by excavating the bottom and margins to such depth, that a stream of water not less than three feet in thickness shall at all times and under all circumstances remain standing thereon, the sides cut with a slope of one foot vertical to one and a half or two feet horizontal, the excavated material, treated with quick-lime or removed to some convenient field for ploughing into the soil.

These mill privileges have reached a most complicated condition. They have been a source of income to the owners, but cannot longer be utilized without endangering the public health except by the outlay of a ruinous sum of money. The law allows a man the free enjoyment of his property so long as he does not use it to the detriment of his neighbor. Here is a clear case of using property to the injury of surrounding lands, and to the serious detriment of the public. It is properly within the power of the local board of health to step in in such cases, and require the mill owners to so use their property as not to have it become a public nuisance, and to require them, when it becomes such, to be put in a sanitary condition. The court has already decided that a board of health can, not only abate a nuisance that actually exists, but prevent the creation of a possible one.

The safety and sanitary condition of a new school-house was the subject of an investigation during the past year. It was the first question of that character upon which the State Board has been asked to express an opinion. The school located at Westchester had just been completed and was ready for occupancy, but the local board of health entertaining fears of its structural safety, appealed to the

State Board to send an expert to examine and report thereon. The report shows a condition of things which amply justifies the interference of the local board of health, but for which serious results might have ensued that are now happily prevented. He found the roof to be unsafe, a tank in the attic for water, that would when filled weigh four tons, too heavy for its supports; the stairs narrow and steep, and the balustrades weak and dangerous. After describing minutely these weak points about the structure, and pointing out the remedies therefor, the expert sums up by stating that while the roof was not at present dangerous, it would become so from the first heavy fall of snow; that the balustrades of the stairways were dangerous in time of panic; that the tank was ready to go through the ceiling as soon as filled; that the water supply was sure to be polluted, and that the plan of the privies was opposed to good morals. This and other cases illustrate the importance of having plans for school buildings submitted to a competent authority to pass upon before being accepted; also the importance of having intelligent supervision of construction rather than cheap labor, which inevitably results in scamping the work and entailing danger and ultimate larger outlay.

An application was made to this Board to send an expert to examine into the sanitary condition of Southampton, Long Island, where typhoid fever was prevailing. The application being made by the Village Improvement Association, the report is addressed to that body. It illustrates the difficulty of inducing village authorities to depart from the old ways, despite the fact that zymotic disease is smiting them on all sides on account of this same defiance of sanitary laws. It has also a bearing upon the economic value of the improvements in question, for, being near New York, it is prized as a country summer residence, and the transcendant importance of having such summer abodes in a salubrious condition becomes at once apparent. The value of the ground depends upon its sanitary character, and with proper improvements its market worth is enhanced four-fold.

The investigation of the sanitary condition of Mount Airy Hotel was occasioned by a communication of Dr. Cyrus Edson, Chief Health Inspector of New York city, to the effect that there were seven persons suffering from typhoid fever in the city who had contracted the disease at this summer boarding-house. The State Board of Health had previously, on various occasions, been called to investigate the sanitary condition of hotels and summer boarding-houses, and has frequently urged the importance of thorough care being taken to put these places in the highest degree of sanitary preparedness, and the suggestions of the Board have, in many cases, been heeded. The condition found at Mount Airy Hotel by Commissioner Dawes was such as might well cause apprehension, and it is fortunate the facts have come to public notice before further injury to health was caused. The local Board of Health, being presented with a copy of the report of Commissioner Dawes, promptly took action, and made certain orders upon the proprietor which, it is gratifying to note, were as promptly complied with. The sanitary condition of summer hotels and boarding-houses in this State is under the jurisdiction of the local boards of health of the places in which they are situated, and it would be wise before commencing another season to make thorough inspections to see that they are sanitarily safe for the reception of guests.

WATER SUPPLIES.

The importance of a pure and wholesome water for a public supply has been more than ever felt during the past year, and much suffering has been caused by the low level of the ground-water which has seemed to prevail in most parts of the country. The city of Syracuse having several sources from which a supply could be derived, and being divided in opinion as to the best, requested, through its common council, the State Board of Health to advise them in the matter, and appropriated money to defray the expenses of the investigation. The report on this subject offers much interestiag study. Its recommendations were adopted by the Board and transmitted to the mayor and common council of Syracuse on the fourteenth of March. Two sources met the approval of the consulting engineer, namely, that from Salmon river and that from the Cardiff reservoir, the advantages of each being fully discussed. One other source, namely, that from Oneida lake, was not approved of for the reasons given. The engineer wisely looked ahead and considered the possibility of future contamination by reason of location and surroundings, and selected the sources that were least likely to be polluted, and to which protection could most readily be afforded.

Application was made for rules to protect the watershed of Hutchinson's river in the interests of the village of Mount Vernon. The rules were prepared by the consulting engineer, adopted by the Board, and will be found in the appendix. The law for the protection from pollution of water supplies has worked well so far, and has been the means of conserving the purity of the water supplies of many places in the State, and doubtless its advantages will be availed of by many others as its provisions come to be better understood. One amendment to it should be secured if possible, and that is, that the power to grant the approval of the regulations made by the State Board of Health necessary to give them legal effect, should not be confined to the county judge of the locality affected, but extended to any justice of the Supreme Court in the judicial district in which the water-works are situated.

CHOLERA.

The arrival of cholera at quarantine on September twenty-third created much alarm and fear that it might get a foothold in this State, and thence throughout the Nation become general. The condition of quarantine, and the existing means of coping with the plague, have already been reported to your excellency, and as the Board can add nothing to what it then stated, its report is herewith included.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *December* 10, 1887.

TO HON. DAVID B. HILL,
Governor of the State of New York:

SIR.—Under the instructions of the State Board of Health, I have the honor to transmit to you a report of the investigations of the board into the late outbreak of cholera at quarantine, New York harbor.

In pursuance of the requirements of section 6, chapter 322, Laws 1880, which says the State Board "shall take cognizance of the interests of health and life among the people of the State, they shall make inquiries in respect to the causes of disease, and especially of epidemics, and investigate the sources of mortality, and the effects of localities, employments and other conditions upon the public health," although the law does not give this Board any direct supervisory power over the quarantine station, and reports of the cholera being alarming, I instructed the secretary of the Board to visit quarantine and make a report to me of his visit. The secretary accordingly visited quarantine October 2, last, in company with the Health Officer, and made a report in writing on the eighth of the same month. This report was laid before the meeting of the State Board held in its office, Albany, November 9, and a committee, consisting of the president, Commissioner Perkins and the secretary, directed to proceed to New York and examine further into the matter, and to learn what measures, if any, had been taken to protect the State from any chance of contagion, and report thereon to the Board.

This committee met in New York, November 17, interviewed members of the New York Board of Health and others who had examined into the matter, and the secretary was directed to communicate with various doctors who had visited quarantine subsequent to his visit, and who had been in consultation with the Health Officer.

As a result of their investigations the following may be stated: On September 23 the ship Alesia came into port with 600 passengers, and eight cases of cholera were discovered on board, which were immediately removed to Swinburne Island for treatment, and 550 emigrants taken to Hoffman Island for observation, the cabin passengers and crew being left on ship. The ship was sent to the lower bay, and rode quarantine for twenty days or more, being, according to the statement of the Health Officer, thoroughly cleansed and disinfected, after which she was allowed to dock.

It appears from all the reports received that the quarantine station was in a most lamentable condition, and in no way fit to receive and properly care for such a number of human beings.

It will give a clearer idea to review in detail each part of the station than to put them into a more general report.

SWINBURNE ISLAND.

This, the lowermost of the two quarantine islands, is fitted with a number of pavilions, connected by a central wide hall. The pavilions are one story, of wood, and approved hospital construction, furnished with water and steam heaters, iron bedsteads, and are well calculated for the work they were designed to accomplish. A superintendent, who is an appointee of the Commissioners of Quarantine, resides here and has general supervision. The docks, grounds and walks are in good condition; buildings likewise. At the time of Dr. Balch's visit there were but two nurses, and no female nurses for female patients. No resident physician was there, and it does not appear from any later information, that one has been employed. The Health Officer acted as attending physician. He is stated to have said, in a report, that the attacks of cholera were very sudden and violent, the stage of collapse coming on in from ten to twelve hours. But one pavilion was occupied with patients.

HOFFMAN ISLAND,

The upper of the two islands, having on it three large two-story brick buildings, two of which had large rooms of 50x150 feet. Here it is that those of the emigrants not absolutely ill, but having been more or less exposed to contagion, were kept under observation. The docks, walks and grounds are in such condition as to call for severe condemnation. The plank-walks and docks are so decayed as to make walking on them a care by day and positive danger by night. The buildings were not ready for the enforced occupation called for. No water for the closets and no steam-power could be at first had. What steam-fittings were there were badly out of repair, but have since been patched for temporary use. There were no means for isolating patients, and no physician to tell whether they were ill or not. The emigrants were placed in three of the large rooms, the two in the north building and the upper one in the south building. The lower floor of the latter was taken for the store-room of the luggage. A small room, originally designed for a wash-room, had been converted into a fumigating room, in which the luggage was subjected to sulphur fumes. It is stated that patients were transferred from Hoffman's Island to Swinburne Island in open row-boats, a more than questionable proceeding for the welfare of the sick.

The third or west building was used for cook-house, boiler-house, etc. Here the food, good and sufficient in quantity, was served out to one or more of a group who were messmates. No knives or forks were used. The manner in which the food was distributed was undoubtedly the means of prolonging the outbreak of the disease. It is now well established by scientific research, that the principal mode, if not the only one, in which cholera is transferred from one person to another, is by means of what is known as the "cholera germ" being allowed to enter into water or other fluids imbibed, or food taken into the stomach. That the water on Hoffman's Island was not impregnated is shown by the comparatively few cases, and that they appeared one after the other, instead of numbers at once. But that fresh cases kept appearing pointed to some cause, and the morbific poison was undoubtedly transmitted from one to another by means of the food, dirty hands, having on them cholera germs, handing the food to others or dipping into the same dish.

No proper means were present for washing; no bath-tubs in which patients could be bathed, and the closets were insufficient. Trenches had to be dug for latrines. No watch was kept of closets or latrines to see how many times any one person used them. No physician was on the island; several guards keeping order. Tents might have been used for isolation; and one was sent, but not put up.

HOSPITAL SHIP.

The old hulk "Illinois" is supposed to be kept in the lower bay from spring until fall; but as no repairs had been made to her for years, as stated by the Health Officer, she leaked so badly she had to be towed back to Gowanus creek, where she could lie safe in the mud.

It being found that, as the disease did not stop, and another ship, the Britannia, having come into port in October, also with cholera infected patients, that the passengers of the Alesia would have to be changed to some other quarters, an old hulk was obtained, fitted up for their reception, and anchored in the lower bay. On this, the disease not having been stopped by the measures so far taken by quarantine authorities, and the coming of the Britannia threatening more, a watch was established over the closets. The Britannia passengers were put on Hoffman's Island; but it appears that those who had been exposed to the infection, families or groups of messmates, were taken to Swinburne Island and placed in some of the empty pavilions.

BOARDING STATION AT CLIFTON.

No patients are landed or treated here. The Health Officer and his deputy have their houses at this station, and from here vessels are boarded and examined. The same neglect and decay are seen as noticed at Hoffman's Island. The houses need painting, and the walks and road-bed repairs. The dock is almost tumbling into the water. No effort seems to be made to keep the place in proper condition.

The Board of Health of New York city, knowing well the manner in which the cholera had been handled at quarantine, made every arrangement to take passengers and their luggage upon their landing and subject them to a further disinfection, it not considering the methods used by the Health Officer to be sufficient, one in which the public could have confidence, unless, under the supervision of a known expert, Dr. Smith would again fumigate in the way the expert suggested. This the Health Officer did, and the emigrants were allowed to land in squads of forty or more.

It further appears that the changing of the Alesia emigrants from Hoffman Island to a hulk procured for that purpose; the watch established over the closets on board; the transference of those liable to have the disease from the great exposure they had been subject to among the emigrants from the Britannia, to the empty pavilions on Swinburne Island; and the landing of the emigrants in New York, in squads, instead of all at once; in short, all the main measures which tended to stop the outbreak and protect the public were taken by the authorities of the quarantine upon the suggestions made by different ones who visited the station during October. The following of those suggestions is shown in the fortunate termination of the outbreak.

No one who has seen the station during the late outbreak could state it was ready for work. The hospital ship, required by law to be kept in commission from May to November, to be at anchor in the lower bay, and to be capable of caring for not less than one hundred patients, was on her station not two weeks, and then was quietly sent to rest in the mud of Gowanus Creek. Hoffman Island was in such a state of decay as to be almost useless. Swinburne Island, alone, was in a condition to give any chance of successfully handling disease. But here no resident physician was stationed, not enough nurses and no female nurse, and the poor creatures under treatment there had to await the coming of the Health Officer to receive attention save what the nurses could give. And the Health Officer stated the attacks in this outbreak of cholera were sudden and severe, the stage of collapse coming on in from eight to twelve hours. Cholera is a disease in which prompt action is called for on the part of the physician. It would seem that from ordinary dictates of humanity, the quarantine authorities would have had enough medical officers employed, if only for temporary service, to fully attend and give all aid in their power to those unfortunate enough to be stricken with such a plague.

The families or mess-groups who had been exposed to infection among the emigrants landed from the Alesia, could have easily been cared for in the empty pavilions on Swinburne Island, and thus have been properly sequestered. This was done with the emigrants from the Britannia with the result of almost immediately stopping the outbreak.

In conclusion, sir, from all the evidence I have been able to collect, it is the unanimous opinion of those posted on such matters, that it would be difficult to imagine a worse state of affairs than now exists at the quarantine station. It is hard to realize in this age of civilization that the harbor of the city of New York should be so inadequately provided with facilities for the prevention and extinction of an epidemic. The State Board of Health does not consider it within its province to pronounce upon the actions of the quarantine authorities. I have merely endeavored to give a few facts concerning the condition of affairs as they were found by the different persons who visited the station, and allow you to form your own judgment upon it. That the health of the State and the country was put in great jeopardy by the culpable unreadiness of the station admits of no question.

I have the honor to remain, sir,
Your obedient servant,
THOMAS NEWBOLD,
President State Board of Health.

The secretary read letters from various parties in response to his application for their views upon the subject.

On motion, the report of the committee was unanimously adopted and ordered transmitted to the Governor by the President.

The conclusions reached in the above report show that many changes are needed at the quarantine station to properly equip it for the work it is expected to perform. Whether the present method of keeping passengers and immigrants under observation at the port of entry until all chance of contagion has passed, is the best, or that of merely detaining the sick and those who have been exposed, and allowing the rest to pass to their various destinations, notifying the respective health authorities of the fact, is still a somewhat mooted question among sanitarians. The State Board of Health considers the latter preferable, as entailing less interruption to commerce and less public inconvenience. Judging from experience in places where this latter practice prevails, it must be conceded that it protects equally, if indeed not more efficaciously, than the older way of detaining sick and well. The object of this Board is and has been to educate the health authorities of the various towns, villages and cities under its supervisory control, to take the greatest possible interest in all matters affecting the public health, or conditions liable to create or spread disease, and to have them in all emergencies ready to protect their respective sanitary districts. Being notified of the coming of persons from a ship which had been infected, they are forewarned and constantly on the watch for the breaking out of disease.

The remodeling of the station is necessary, but attention is respectfully called on this point to the recommendations submitted by the Board.

ADULTERATION OF FOOD AND DRUGS.

During the past year the three analysts of the board have been actively engaged in investigating the food and drug supply of the State. The design has not been to collect samples indiscriminately and in large numbers with a view to determining the percentage of adulteration practiced, since such an investigation was prosecuted by a large staff of chemists employed by the Board some years since and the results published in the Second Annual Report. The quality of our most important food articles and drugs and their liability to adulteration is pretty well understood, and the object therefore has been to select for examination those articles most likely to be adulterated, falsified or of inferior strength or quality, and by prompt notifications sent to the sellers of such to warn them from continuing their sale. Frequently the retailer is ignorant of the character of the goods in which he deals, and in many cases of the provisions of the law, and though such ignorance can scarely be urged as a valid excuse for wrong-dealing, it is clearly the wisest course to admonish and warn before proceeding to severer measures and to exhibit a willingness to co-operate with dealers in their efforts to better the quality of the goods they sell. Most excellent results have in this way been accomplished. Retail dealers have been stimulated to a greater degree of carefulness and have felt that a supervision is being exercised over them, and manufacturers have learned, in many cases, from the complaints of their customers who have frequently returned to them goods condemned by the Board, that their products must fulfil the requirements of the law. The course adopted commends itself to all reasonable people, whatever their relation to the work may be, and the Board has received on all sides the heartiest commendation from leading manufacturers, dealers and others interested in securing pure food and good drugs for the people. A greater stringency and more peremptory measures may at some future time become necessary, but the Board believes that, with the means at its command, results so good could be accomplished in no other way.

The appended reports of the analysts set forth the work done by each. Monthly reports have been made to the Board by each analyst, and prompt notices have been sent to all delinquent dealers, who have, in almost every instance, exhibited a ready willingness to remedy errors and cease the sale of inferior articles.

The analyst of food has examined a considerable number of largely-employed food articles and accessories and has pointed out various fraudulent practices which should be suppressed. Fortunately most of the common sophistications are such as affect the pocket of the consumer more than they injure his health, but they are none the less to be condemned.

The analyst, whose province it is to examine those drugs which contain medicinal alkaloids, has devoted his time to an exceedingly careful and thorough examination of preparations containing quinine and morphine, the most important articles of their class and likewise those most liable to adulteration or short weight in the product. Sulphate of quinine in bulk and in pill form, citrate of iron and quinine and pills of sulphate of morphine, as made by all the leading manufacturers, have been assayed, and while the quality of these all important remedial agents is somewhat better than was found to be the case last year, there is still room for great improvement. No more thorough work has been done in this direction than that here reported upon, and the result must be that dishonest manufacturers, in this State at least, will soon be driven from the market.

The general analyst of drugs has examined 326 samples, including many of the most important medicinal agents, like chloroform and ether and a variety of other pharmacopœial articles selected with a view to testing the knowledge, accuracy and integrity of dealers. The samples were purchased in thirteen places, including large cities, towns and villages, and in all cases were called for in writing, the names of the articles required being fully given and none but pharmacopœial articles concerning the nature of which no question could arise were demanded. Of the 326 samples examined forty-three per cent were of good quality; fourteen per cent of fair quality, and forty-three per cent of inferior quality, or of a different nature from that demanded. Only those articles known to be frequently adulterated or of inferior quality were selected for collection, and these percentages, therefore, by no means represent the proportion of good, bad and indifferent drugs on the market.

It is proposed to continue work during the coming year on essentially the same plan as that here reported. New portions of the State will be visited and further samples collected from those dealers whose goods have been found to be of inferior quality, and the names of those who fail to heed the warnings of the Board will be promptly published. It is believed that the work done during the past two years has had a most beneficial effect in improving the quality of the food and drug-supply of the State, and that this result has been accomplished without unnecessarily interfering with any legitimate business industry.

SANITARY CONDITION OF THE STATE AND VITAL STATISTICS.

In former reports of this Board these two subjects have been presented separately; they are so closely allied that an exhibit of the health of the State for the year just ended can be best made by combining them under one heading. A systematic record of the vital statistics, that is being kept with more care now than formerly, assists materially in making up the exhibit of the movements of disease during the past year and of the sanitary condition of the State at the beginning of the new year. Reports of epidemics of preventable diseases have been made from various localities, and investigations that have been made, together with the monthly reports of mortality, will appear in the appendix.

SUMMARY OF MORTALITY REPORTED IN THE MONTHLY BULLETIN.

The Bulletin of Mortality issued monthly by the Board shows an approximation to the entire death-rate of the various localities of the State. It is necessarily incomplete to a degree, for all the returns from local Boards of Health are not fully received at the time of its issue. The Board would here again enforce upon the attention of health officers and registrars of local boards the necessity of reasonable promptness in sending their returns of vital statistics; if the requirement of the Board, that all returns for a calendar month shall be sent at one time on or before the fifteenth of the month following (which certainly gives ample time for their collection and local record), the information of the Board would be much more complete and ready at hand than now, and the systematic work of the central office much facilitated. The preparation of the Bulletin is delayed until after the fifteenth of each month, but fails to contain from two hundred and fifty to five hundred returns of mortality that should have been credited to the month, because of their receipt after its issue. An account is kept in the central office of the Board, with each local board, in regard to its reported mortality, but only by promptness of report can a full statement appear in the printed bulletin. With this reservation as to completeness, the Bulletin has furnished through the year a current history of disease in the State, so far this is shown by a record of the mortality. The total number of deaths that have been reported in its twelve issues is as follows by months:

	Total number of deaths.	Percentage of deaths under 5 yrs. to total deaths.	Zymotic deaths per 1,000 deaths from all causes.
January	7,671	36.8	162.91
February	6,653	36.8	159.00
March	7,830	32.5	211.11
April	7,967	30.6	136.20
May	7,528	32.6	153.85
June	7,484	40.0	240.00
July	11,463	52.7	389.68
August	9,042	45.3	383.30
September	8,267	39.0	261.13
October	7,370	31.3	201.63
November	7,292	29.7	200.00
December	7,886	31.8	185.90

The total number of deaths thus reported for the year is 96,453, the percentage of infant mortality being about thirty-seven, and in each thousand deaths there were about 225 deaths from zymotic diseases. These two, the death rate from zymotic diseases and the infant mortality, are accepted gauges of healthfulness, the former because they are the diseases which prevail in epidemics and are susceptible of control, the latter because the young are more likely to contract these diseases, or to be affected by the unsanitary conditions of their environment.

Compared with preceding years, there were in 1884, 269.12 deaths from all zymotic diseases in each 1,000 deaths from all causes, in 1885 there were 222.17, and in 1886 there were 217.23, that of 1887 being as already stated about 225. The reasons for this variation will receive consideration a little further on in this report, when the more important of these diseases will be studied separately.

It will appear evident in this place, however, by a glance at the table of deaths by months, that, guided by this gauge, the seasons of the year vary much in healthfulness; it is more apparent judging by the zymotic death-rate than by the infant death-rate. For the sake of including in groups the months of the four seasons, we will take December, 1886, and January and February, 1887, for the three winter months, and we find that in these three months there were 21,927 deaths; of these 36.6 per cent were of children under five years of age, and in each 1,000 there were 177.30 deaths from zymotic diseases. In the three spring months there were 23,325 deaths from all causes; of these 31.9 per cent were of children under five years of age, and in each 1,000 there were 167.05 deaths from zymotic diseases. In the three summer months there were 27,989 deaths from all causes; of these 46.0 per cent were of children under five years of age, and 337.66 were deaths from zymotic diseases. In the three autumn months 22,929 deaths from all causes were reported, of which 33.3 per cent were under five years of age, and 220.93 were from zymotic diseases. The following table shows these details at a glance:

	Total number of deaths.	Percentage of deaths under five years.	Zymotic deaths per 1,000 deaths from all causes.
In the winter months	21,927	36.6	177.30
In the spring months	23,325	31.9	167.05
In the summer months	27,989	46.0	337.66
In the fall months	22,929	33.3	220.93

The average for the year shows that of the 96,170 deaths thus reported, 37.7 per cent, or about one-third, occurred under the age of five years, and 22.5 per cent, or between one-fifth and one-fourth, occurred from zymotic diseases.

It is further apparent that the spring months are the most healthful of the year, judging by this standard, since the fatality is materially less both to children and from zymotic diseases. It will doubtless be found generally true that spring is the healthiest season. It is further noted that in the fall months the death-rate of children is but little higher than in the spring. In 1886 the infant death-rate was considerably higher, while in 1885 the percentages for the two seasons were exactly the same. In the three winter months, on the other hand, there is a material increase in the death-rate of young children, without a corresponding increase in the zymotic mortality, there being a difference of nearly four per cent. The reason for this is, partly, a considerable mortality from measles; but the greater prevalence in the winter season of acute respiratory diseases seems to be, in the main, responsible for the increase. It is in the three summer months, however, that the great infant mortality occurs, an increase which will be found in every year, and due to the immense increase at this season of diarrhœal diseases, by means of which nearly one-half of the deaths occurring during this quarter of the year are of children under five years of age. In fact, more than half the mortality in July is of young children.

The following comparative exhibit of the infant mortality during the four seasons of the last three years will show the variations that occur from year to year.

Percentages of deaths under five years of age to total mortality by seasons.

	Winter.	Spring.	Summer.	Autumn.
1885	33.1	33.1	47.1	33.1
1886	32.2	31.9	45.0	38.7
1887	36.6	31.9	46.0	33.3

With two exceptions it will be noted that there is but little variation year by year in the percentage of deaths under five years of age in the various seasons: the high autumn death-rate of 1886 being due to the continuance of diarrhœal diseases from the summer into September; the high rate of the winter of 1887 has been referred to above.

It is not possible to speak exactly regarding the causes of infant mortality, as no record is kept of the ages of decedents by diseases. But in general it may be said that it will be found to vary with the prevalence of most of the zymotic diseases and with that of the large class of diseases reported under the head of nervous diseases.

As far as *season* affects the prevalence of zymotic diseases some information may be obtained from the following table, which also shows their comparative respective prevalence for three years.

In each 1,000 deaths there were, from zymotic diseases:

	Winter.	Spring.	Summer.	Autumn.	Entire year.
In 1885...............	138.85	144.44	325.74	209.05	202.02
In 1886...............	166.51	142.70	294.18	237.46	210.41
In 1887...............	177.30	167.05	337.16	220.93	225.61
Averages	160.88	151.40	319.19	222.48	215.50

The bearing of season on the prevalence of zymotic diseases is a matter of interest; the influences are not limited simply to variations in heat and cold, but there are changes in domiciliary conditions, in the movement of ground air, in the activity of decomposition of organic matters, and there are also differences in the vitality of the various disease germs at different seasons of the year. Some diseases are common to one season, some to another. The total of zymotic diseases, as is apparent from the table, is smallest in the spring season; there is a greater prevalence of them in the winter, but the difference is inconsiderable; in the autumn there is a marked increase, and in the summer there is by far the greatest prevalence of all. Thus, the average death-ratio per 1,000 deaths from all causes from zymotic diseases during the past three years has been 213.48; in the spring months there have been 72.08 less deaths from these diseases in each 1,000 deaths from all causes than the average for the whole year; 52.60 less in the winter; nine more than the average in the fall; and in the summer 105.71 more than the yearly average.

In order to learn the comparative prevalence of different diseases at different seasons, so far as may be learned by the records of this board for the three years just ended, this table has been prepared. It shows the percentage of each of the zymotic diseases, as classified by us, to the total number, arranged in parallel lines for each year, by seasons, the average for the three years being given.

Percentage of each zymotic disease to the total number of zymotic diseases for three years, by seasons.

	Total zymotic diseases.	Do. per 1,000 deaths from all causes.	Cerebro-spinal fever.	Typhus fever	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping-cough.	Diphtheria.	Diarrhœal diseases.
WINTER.													
1885	3306	135.85	3.5	......	7.4	6.4	......	11.0	13.5	3.2	4.9	41.9	8.7
1886	3265	166.51	3.1	1.3	5.6	5.5	0.5	11.3	1.4	3.3	12.0	47.6	7.2
1887	3822	177.30	3.9	......	6.3	5.0	1.2	6.5	24.0	2.5	4.0	39.1	7.1
Averages		160.88	3.5	......	6.4	5.6	......	9.6	16.3	3.0	7.0	42.9	7.7
SPRING.													
1885	3130	144.44	4.0	......	5.9	7.0	......	12.7	17.1	4.6	5.4	31.9	11.3
1886	3110	142.70	5.8	0.3	6.1	7.3	0.6	11.7	2.9	4.4	11.0	40.7	9.3
1887	3899	167.05	3.8	......	4.2	5.0	2.0	8.3	9.2	3.3	2.7	38.9	22.5
Averages		151.40	4.5	......	5.4	6.4	......	10.9	9.7	4.1	6.4	37.2	14.3
SUMMER.													
1885	7683	325.74	1.6	......	2.8	3.5	......	3.3	3.3	0.8	3.2	11.2	70.1
1886	7027	294.18	2.1	......	3.1	2.5	......	2.3	2.6	0.7	5.3	15.3	66.3
1887	9174	337.66	1.6	......	3.8	2.5	0.3	2.5	1.4	0.6	1.5	12.5	73.0
Averages		319.19	1.8	......	3.2	2.8	......	2.7	2.4	0.7	3.3	13.0	69.3
AUTUMN.													
1885	3751	209.05	2.2	......	11.2	7.1	0.5	4.5	0.9	1.2	5.6	32.5	34.2
1886	4725	237.46	2.5	......	11.1	6.1	......	3.3	5.6	1.2	5.0	34.2	30.6
1887	5076	220.93	2.1	......	11.5	6.5	0.4	6.5	1.2	1.0	1.5	42.2	28.0
Averages		222.48	2.3	......	11.3	6.6	......	4.8	2.6	1.1	4.0	36.3	31.0
Entire year:													
Averages		......	3.0	......	6.6	5.3	......	7.0	7.8	2.2	5.2	32.3	30.7

From this table the influence of season upon the prevalence of the different zymotic diseases is quite apparent. It will be seen that hardly one of them occurs with uniformity throughout the year; some are evidently controlled by the influences existing at one season, others by conditions peculiar to another. With the exception of smallpox and typhus fever, which have caused but few deaths, and the exotic diseases, as cholera and yellow fever, of which there have been no cases, there is no season in which some cases of zymotic diseases fail to occur, but in very variable intensity. This may be best seen by comparing each season's averages with the average of the entire year. It is seen that the spring shows the least deviation from the average; there are but two diseases, cerebro-spinal fever and malarial, which exceed the average at this time, and they but slightly. In the summer there is the widest deviation, for owing to the great preponderance of diarrhœal diseases at this period, which caused almost three-fourths of the zymotic deaths, all other diseases of this class are thrown much below the average. In the winter eruptive fevers and diphtheria prevail most extensively, and in the fall typhoid fever and the malarial diseases.

These general facts regarding the seasonal prevalence of zymotic diseases, and the deductions from the records compiled in this table, do not differ from common observation, but, though lacking in novelty, are of value as added testimony to what is ordinarily accepted. The table shows the relations of nearly 60,000 deaths from zymotic diseases distributed over a period of three years and the entire State, representing the sum of deaths in the varying conditions of life from those of the metropolis to those of the most rural districts.

PREVALENCE OF ZYMOTIC DISEASES IN 1887.

For the year covered by this report the sum total of mortality from zymotic diseases, which are of more especial concern to health authorities, was higher than the average of the three years already referred to. For the entire year the deaths per 1,000 total mortality were about twenty-five in excess of the average. This excess was confined to the winter, spring and summer seasons. The table last given will show wherein this excess consisted. We find that in the winter all were less than the average except measles. Increased prevalence of this disease began in the fall of 1886 and continued during the early months of 1887, causing, during the winter months, nearly one-fourth of the whole zymotic mortality. This is a disease very variable in its degree of prevalence, being low in 1886 and high both in 1885 and 1887. In the spring months the excess is traceable to diarrhœal disorders, there being also a small excess of deaths from diphtheria. In the summer there was an unusual number of deaths from diarrhœal diseases, which caused nearly three-fourths of the total zymotic mortality, the percentage of all others being generally below the average. In the autumn the total average from zymotic diseases was below the average for the three years and considerably below that of the year preceding, but there is an increase in the percentage of deaths from scarlet fever and diphtheria.

A statement of the percentages of the various diseases for the years reported, shows only their comparative prevalence; a more accurate knowledge of the prevalence of these diseases is obtained by comparing the zymotic with the total mortality. This has already been referred to. It will be of interest to refer to each disease separately.

CEREBRO-SPINAL FEVER.

In the twelve months to December, 1887, there were 554 deaths from this disease. A peculiarity of this disease as shown by the records of this Board is the slight degree to which it is influenced by season. It has occurred, with but little variability, in all the months of the year. Nor is there material variation in its prevalence year by year, from thirty to sixty deaths being reported every month for the past three years. As to its distribution, however, we learn that it is more a disease of the city than of the country. The large proportion of cases is reported from sanitary districts containing a large city population. Nearly one-half of the deaths are reported from New York city, where its prevalence has attracted attention. Buffalo has also reported a considerable number of cases. At the same time it is a singular fact that not one case has been reported from Brooklyn during the year, nor in fact during the last three years. From other localities, irrespective of size, there has been a steady prevalence of it. Thus, not a month has passed without the report of a considerable number of cases from Troy; from Ogdensburg and Gouverneur it is also pretty uniformly reported. Some parts of the state, especially a large area of the central and western, are quite free from it. While sporadic cases of it are reported, it is evident, from the observation of its occurrence which our records afford, that it is essentially an endemic disease, and that the underlying causes, concerning which so little is accurately known, are such as tend to secure a foothold in a locality and remain constantly operative for a continuous and lengthy period. That these are but slightly influenced by season also appears. Probably it is more likely to prevail under circumstances and conditions set up in the thickly inhabited locality rather than in rural regions. There seems to be from the records of this Board some contributory weight given to the accepted view as to its relation to, and to some degree dependence upon, a high level of ground water; but it is a disease which is to be studied on the locality where it has established itself, where everything which might have a bearing upon it can be well investigated, rather than by generalizations upon the disease spread over a large area. No doubt not a few cases are erroneously reported under this name, and at any rate it is one of the minor zymotic diseases as far as present and prospective prevalence of it is concerned. The telluric or other conditions upon which it depends are, however, no doubt yet to be found out more satisfactorily, and thereby some degree of lessening the number of zymotic deaths effected.

TYPHUS FEVER

the State was practically free from during 1887, a single case only having been reported, from Brooklyn, in April. It is a disease that has not been known outside of the metropolitan center, except for an outbreak at the close of 1885 and the commencement of 1886 in the Albany County Penitentiary.

TYPHOID FEVER

has presented no peculiarities nor unusual prevalence during the year. In fact it has been slightly below the average of the three years past. According to common observation, it has been especially prevalent in the fall. In the entire year there were about fourteen deaths per 1,000 total mortality, in the fall about twenty deaths per 1,000 being from this malady. There is no month in the year, however, in which the disease fails of occurrence. It does not show the variability of prevalence that is exhibited by some other zymotic diseases.

SMALL-POX

in 1887 was limited entirely, so far as fatality is concerned, to the maritime district, except a limited outbreak causing three deaths at the beginning of the year, in Albany. New York city and Brooklyn have reported cases through the year, and have been the apparent center whence cases have originated in their vicinity. New York has reported deaths from this cause every month, and it has been equally prevalent in Brooklyn. Limited outbreaks occurred, in May, in the adjacent city and towns of Long Island City, Jamaica and Newtown, each reporting a single death. An epidemic resulting in six deaths began in August in Edgewater, on Staten Island. Cases were also reported as having been discovered in the month of April in New Rochelle, Sing Sing and Westchester, all in Westchester county, no death being reported. For twelve months 175 deaths from this cause have occurred in this State. At the time of preparing this report, in January, 1888, cases are being reported beyond the limited center of the maritime district, fresh cases having appeared in Albany, near the village of Peekskill, Westchester county; near Waverly, Tioga county, and in the town of Milo, near Penn Yan, Yates county. While the Hudson valley cases can be probably traced to New York, those in the western part of the State have a different origin. The outbreak near Waverly is traced by the local health officer to Potter county, Pennsylvania; that near Penn Yan seems without doubt to have been contracted from paper-mill rags. Paper stock being gathered in all sorts of localities, it is desirable that especial care should be taken to have all employes who handle the rags in paper mills, before they are put to bleach, well vaccinated, to guard against the chance of small-pox.

Occasional outbreaks of small-pox stimulate the work of vaccination, which, after all, is the only preventive measure of value, proof of which, if needed, is very forcibly given by the experience of Switzerland, where repeal of a compulsory vaccination law in 1883 was followed by immediate prevalence of the disease, amounting to eighty-five deaths in each 1,000 in 1886; no deaths from small-pox occurred in 1882. No doubt the threatened spread of the disease from Montreal in 1885 stimulated vaccination throughout this State. There is little danger of small-pox gaining foothold or causing material mortality except in large cities. In 1885 there were but thirty-three deaths from small-pox in the State, and in 1886 there were thirty-nine.

SCARLET FEVER

has prevailed in limited epidemics in numerous localities of the State, but the total mortality from this cause, month by month, has been lower than it was in either of the two years preceding 1887. It is especially a disease of the winter and spring seasons, as a uniformly observed fact. Thus for three years past the average of deaths from scarlet fever to the total number of deaths from zymotic diseases has been seven per cent, more than five per cent of which occurred in the first six months of the year. For 1887 about six per cent of the zymotic deaths were from scarlet fever, and 1.02 per cent of the total mortality.

Considerable attention has been given during the year past to some of its possible causes. Outbreaks were investigated by Mr. W. H. Power, of the English Government Board, and traced by him to milk from diseased cows, affected by a vesicular eruption, followed by ulceration on the udder. Some of the matter from those sores was investigated by Dr. Klein, who cultivated a micro-organism which reproduced similar lesions when inoculated in healthy calves. If the identity of this disease of cows, thus reported by these capable observers, is established — and this has, it should be said, been, apparently with good reason, questioned by more recent investigators — this possible origin of a disease so often intensely fatal should be borne in mind by health officers in the investigation of epidemics. The observations of our own Board have added confirmation to the possibility of milk becoming the carrier of typhoid fever germs, and it becomes a question whether the sources of this important article of food should not be put under more systematic supervision.

MEASLES

is likewise a disease of the cold months. In the three winter months 919 deaths were reported, less than 1,500 having been reported for the year, the total mortality from all causes for the year being 96,500, making a percentage of 1.56 of all deaths; the percentage of the zymotic mortality being 8.95. In the first six months of the year 16.6 per cent of all zymotic deaths were from measles; in the last six months only 1.3 per cent. The mortality from this cause was considerably larger in 1887 than in 1885 and 1886.

WHOOPING COUGH

caused but 475 of the 96,500 deaths that occurred in 1887. In 1886 there were 1,244 deaths from it out of 86,800 total mortality, and in 1885 there were 834 out of 80,400 deaths. It is even less prevalent at the close of the year than at the beginning.

DIPHTHERIA

is the most important of the zymotic diseases at the present time; in fact, it has been for years. It caused 32.35 per cent of all the zymotic mortality during the last three years, and during the last year 33.20 per cent. In 1885 there were 4,500 deaths from it out of 80,400 deaths from all causes; in 1886 there were 5,600 out of 86,800, and in the twelve months ending December 1, 1887, there were 6,271 deaths from this cause in 96,500 deaths from all causes reported. It thus appears that about one-third of all the zymotic mortality, including the great summer mortality from diarrhœal diseases, and 6.50 per cent of the deaths from all causes, were from diphtheria. It has caused more deaths than any other zymotic disease, being about equal to the death-rate from the diarrhœal disorders which in midsummer occasions nearly one-third of the total mortality.

There has not been a month in which it has not occurred largely; in the summer it has both a relatively and absolutely lower death-rate, about 300 deaths out of 9,000 being from it, while in November there were more than 800 in 7,300 deaths. It has been especially prevalent during the autumn months of 1887, exceeding considerably the proportion of the other seasons, but has not yet reached the high death-rate of the winter months of 1886, when, as the table previously given shows, well on towards one-half of the zymotic mortality was from diphtheria.

New York is far from being alone in this predominance. Throughout the New England States epidemics have been reported causing many deaths. It is also extensively prevalent through the Middle States, and in fact in the Northern States generally. The same is found to be more or less true from the reports of the health boards of the northern European countries. The last report of the Local Government Board contains the results of investigations made in England.

It is of great importance that efforts should be made to ascertain the causes for the prevalence of a disease, which while with propriety classed as preventable, has nevertheless been responsible for so immense a death-rate in the best portions of the world, though study of its origin has by no means been lacking. Mr. W. H. Power, to whom reference has already been made, brings new testimony to the possibility of milk acting as the carrier of the disease germs, and this, doubtless, must be included among the factors to be considered in investigating epidemics. Another investigator of the Local Government Board, Dr. George Turner, brings some evidences to prove the hypothesis that it may be communicated from the lower animals, when affected by a throat or nasal disease presenting symptoms similar to diphtheria. Dr. John C. Peters, of New York, has recently said: "To me diphtheria is simply a sore throat with the impression of foul air upon it," and he traces an etiological relation of uncleanliness of streets and the like to it.

Whatever bearing any special alleged causes may have in the propagation of diphtheria, and many have been advanced, the general conviction up to the present time that in a broad sense the persistence of the disease depends fundamentally upon *filth*, as the word is used by sanitarians, is doubtless true, more especially upon filth of the dwelling, school-house or other gathering-places where children susceptible to the disease may be exposed. Our investigations through the year have added to this conviction. In the large cities public and domiciliary unsanitary conditions are so combined that it is not easy to disassociate them, but in rural hamlets this is possible, and it is easier to study their respective values as etiological factors. Unquestionably there are conditions affecting the healthfulness of houses which depend for remedy upon the action of village authorities, and the necessity of providing this relief has frequently been recommended as one of the means of checking diphtheria. For instance, the lack of suitable provision for house-waste disposal, requiring the construction of sewers, has been found necessary, or, as in the case of the village of Moravia, the existence of an undrained swampy place defiled with sewage and believed to have a bearing upon the persistence of the diease. But the main preventive will lie in the householder's care to clean his premises, to drain the soil, so that, provided the level of ground water is high, the cellar air (which is sure to find its way up through the house), may not be polluted by filth from the soil, carried in by the seepage of moisture holding it in solution, to not allow the existence of leaching cesspools and privies, and generally to keep his house and surroundings pure. In this connection it may be said that there is found too much indifference to the danger from kitchen wastes. We have the authority of Baldwin Latham that it is quite as offensive as fecal discharges. That leaching cesspools are innocuous is a universal error of belief among the people. There is good reason to believe that they are much more harmful than the ordinary privy pit, on account of such large volume of fluid as to establish underground avenues quite likely to reach the cellar and well.

It is believed that the purity of the inspired air is of special importance, and next to that purity of water, and then possibly of milk, and with remote possibility other foods. This view is not specially new nor specially our own, further than the corroboration of it by the year's observation. The New Jersey Board of Health has laid strong emphasis upon this, and especially upon neglected cellars as a fruitful source of diphtheria.

The Board has also learned this year to place greater weight upon the *necessity of isolation* of all cases of the disease. There have been those who attribute the rise of diphtheria exclusively to foul air. That the disease is *contagious*, that there develops from every case of it some morbific material which, transmitted to a susceptible individual, causes him to contract it; that this material comes largely from the sputa, but may come from all the excreta of the patient, that it may be carried by the well who have been in contact with the sick, that it lodges in clothing and all fabrics in any way contiguous to the sick, and clings to the walls of the sick-room, and, wherever lodging, that it has a very considerable longevity — these are facts of which we are more fully convinced than heretofore. All this contagia must be kept within the closest limits, not necessarily interfering with the hygienic care of the sick person, which is of the utmost importance for their own well-being, and having been so kept in and isolated, destroyed by fumigation after recovery and removal of the patient. And the sick should be secluded, at least from contact with children, for a long time; until entire recovery of all sore throat. Undoubtedly too often children are allowed to return to school too early.

In the line of these two things, (1) the cleaning up of domiciles and premises, and (2) isolation of the sick with destruction of the disease germs, we look for the remedy of diphtheria.

As to the distribution of diphtheria over the State, it may almost be said that there are few health districts entirely free from it. It has prevailed in cities and towns, being equally an urban and a rural disease. It has prevailed under two conditions which are worth considering. In some cases it has appeared as a sudden and transitory epidemic; in others it has persisted for months and years. The cause of its first appearance cannot always be ascertained, but sometimes it can with satisfaction. In Nassau, an account of which is in the appendix, its rise was clearly traced to the adjacent town of Lebanon, which in turn very likely received it from the adjacent towns of Massachusetts. It had not been known to have ocurred, at least for many years, according to the knowledge of the local health officer. It advanced along the route of common travel, till, reaching this town, it gradually spread over it, and especially throughout the village, lasting up to the present time for nearly two years. This instance illustrates very well the conditions on which the disease, as we tentatively believe, depends; there were the common insanitary conditions ready. but these failed (possibly, we may allow, because in no instance intense enough) to originate the disease. When imported, however, the germs found a soil suitable for their sustenance in the filth allowed to exist, and thriving thereon found their way to one and another from time to time. Our remedy for this illustrative case is, first to destroy completely all disease germs as they are given off by each patient, and then to clean up and disinfect the premises generally, but especially those on which cases of the disease have occurred. This should be an essential principle in the management of this disease.

In cities the sanitary problem is larger and less easy of solution, being complicated by conditions which receive emphasis especially from those who have studied the disease only in its urban manifestations; but still in many of the villages it has peculiar embarrassments. The general fact of the necessity of isolation and sanitation in controling the disease is one along side of which each local out-break is to be laid.

It is well to note the recorded experiences of Secretary Baker of the Michigan State Board of Health, which he reported during the year. In 461 outbreaks of diphtheria in 1886 there were 3,085 cases and 656 deaths, an average of 6.69 per cent of cases and 1.42 per cent of deaths. In 102 outbreaks, where no restrictive measures were taken, there were 1,650 cases and 329 deaths, an average of 16.18 per cent of cases and 3.23 per cent of deaths. In 116 outbreaks, in which isolation and disinfection were enforced, there were 332 cases and seventy-seven deaths, an average of but 2.86 per cent of cases and .66 per cent of deaths. Judging by which figures, Dr. Baker estimates a saving of 1,545 cases and 298 deaths from diphtheria in Michigan in 1886. These statistics prove conclusively the value of restrictive measures. In the light of them, and of the experience of health authorities elsewhere, no health board is justified in failing to enforce the most complete quarantine in every case of diphtheria which, if followed by subsequent destruction of all disease germs and the institution of sanitary measures, will break up, so far as the possibility of the case admits, all breeding-beds for the germs; and all possible exclusion of them from houses will, in the most certain way we know up to the present time, cut short a disease which, more than any other, is now causing a large and needless number of deaths.

DIARRHŒAL DISEASES

are included under the head of zymotic diseases and constitute by far the largest number of any of them. This fact is swelled by the large proportion of city population in the State. In a population approaching six millions there are in five of the twenty-six cities 2,655,000 inhabitants; in eight others there are 310,000, and in the remaining thirteen there are 210,000. It is in the cities that the conditions prevail which raise the diarrhœal death-rate in the hot months. During the three summer months for three years seventy per cent of the zymotic deaths were from diarrhœa; in the entire year a little more than thirty per cent of the zymotic mortality was from these diseases. During 1887 the death-rate was greater than either preceding year, being seventy-three per cent of all zymotic diseases in the summer months, which during that part of the year were characterized by long spells of heat and humidity, and 32.6 per cent for the whole year.

MORTALITY FROM DISEASES NOT ZYMOTIC.

The remaining diseases causing, of necessity, the bulk of the mortality have many interesting matters for study to the statistician, but their immediate sanitary bearing is of much less interest to sanitary investigators. They include the diseases often classified as constitutional, developmental and local. Our classification of them is under the following groups, against each of which is placed the number of deaths that occurred during the period of twelve months ending December first, which period of time has been taken for considering the zymotic diseases. During this period there occurred the following number of deaths respectively:

From acute respiratory diseases..............................	11,779
From consumption..	11,634
From puerperal diseases......................................	873
From diseases of the digestive system (not diarrhœal)...	5,496

From diseases of the urinary system	4,550
From diseases of the circulatory system	5,668
From diseases of the nervous system	9,940
From cancer	2,322
From accidents and violence	3,718
From old age	8,452
From unclassified causes	9,745

The number of deaths from these causes, month by month, and by sanitary districts, will be found later in this report.

Without doubt, a classification which inquired into the etiology of individual cases, would place many of those reported under these causes, as more properly belonging among the zymotic diseases. Some of these are questionable and still *sub judice.* Recent researches have developed micro-organisms, supposed by their investigators to be the cause of some at least of the cases reported as pneumonia, and outbreaks of infectious pneumonia are spoken of. There is, therefore, good reason to believe that some such cause is to be included among the etiological factors of this disease.

Consumption has, without doubt, many features that would place it in the zymotic list. It is coming to be accepted in the minds of many of the medical profession, that it also has a micro-organism of its own upon which it depends, and which is the medium of contagion. Without laying weight upon this, which many will not accept, the etiological bearing of some common unsanitary conditions is certainly beyond doubt.

The puerperal diseases also might, with about as much propriety as the diarrhœal diseases, be placed among the zymotic; a large proportion of cases so reported are dependent upon the same general causes with which the zymotics are associated. For this reason the combined death-ratio of zymotic, consumption and puerperal diseases has been reported in each Monthly Bulletin. For the year this combined death-ratio was about 358 per 1,000 deaths from all causes.

The death-rate from consumption for 1887 was lower than for the years preceding, being at the rate of 120.60 deaths to each 1,000 deaths from all causes. There were 190.60 deaths during the year in each 1,000 deaths from all causes above the age of five years, under which age it does occur.

Nervous diseases include a large number which are so reported, but which ought to have been returned as from some other cause, and probably a considerable number of the actual causes of death were really zymotic. The final symptoms of the patient were such as were of a nervous character, and these the attending physician reported as the cause of death. The number returned as deaths from nervous diseases is very much larger in the hot months, and some of them should have been sent in as diarrhœal. It may be allowed, however, that this fact is balanced by the inclusion under zymotic diseases of deaths which occurred from diarrhœal diseases not zymotic in origin.

From Old Age about 9,000 deaths were reported, being 93.26 to each 1,000 deaths from all causes. This proportion is higher than that of either 1885 or 1886. It suggests that there is considerable variety in the reports of the causes of death of aged persons. Some uniform plan would be desirable. Some of our principal reporters include under this head all deaths above the age of seventy. No doubt, with exceptions, this would be proper, but manifestly it would not be a correct universal rule. It is not a correct return of mortality, for instance, to report deaths from small-pox chancing to occur in a person over seventy as a death from old age. The same would be true of the other zymotic diseases, to which the aged are very insusceptible, however.

To obtain some light on the subject as to what causes of death are given for old persons, where a definite cause is given, the following interesting statistics have been obtained from a study of death certificates received at the central office during the year:

The five months, July to November, covering a period of the year sufficiently illustrative, were taken, and during this time certificates of deaths from all parts of the State, not, however, including the large cities which are not by law required to transmit their returns to this office, were assorted into those dying under sixty years of age, those between sixty and seventy, and those above seventy. There were 13,400 deaths of all ages; of these 1,531, or 11.43 per cent, were between sixty and seventy years of age, and 2,542, or 19.00 per cent, at and above the age of seventy. This proportion is, as will be noted, much larger than that of the deaths reported as from *old age* during the year, which was about 9.33 per cent.

Of deaths over seventy years of age the alleged causes of death given in the reports were as follows:

Diarrhœa (of these 140 occurred in July and August)	228
Typhoid fever	15
Malarial diseases	23
Erysipelas	15
Cerebro-spinal fever	2
Respiratory diseases (chiefly pneumonia and bronchitis)	194
Consumption	73
Diseases of the digestive organs other than diarrhœal, (of which sixty were diseases of the stomach, including ulcer but not cancer, thirty were diseases of the liver, thirty peritonitis, and the rest hernia, typhlitis, etc.)	178
Diseases of the urinary system (seventy-six being from disease of the kidneys and forty of the bladder)	160
Diseases of the circulatory system (this including valvular disease of the heart, fatty heart, "neuralgia of the heart" and heart weakening)	313
Diseases of the nervous system (of which 250 were apoplexy, forty softening of the brain, the rest "paralysis," mania, epilepsy, etc.)	450
Cancer (of the stomach, liver, uterus, face and external parts being reported)	91

Accidents and violence (including one from suicide, the rest being from fracture of femur, burning, falling, railway accidents)	67
Unclassified causes (gangrene, rheumatism, etc.)	90
And, finally, returned as	
Old age (without other cause or mode of death being noted),	663

Of the 1,531 deaths between sixty and seventy which were taken for the sake of comparison, the following causes of death were given:

Diarrhœa	138
Typhoid fever	20
Malarial diseases	18
Erysipelas	4
Diphtheria	1
Respiratory diseases (bronchitis and pneumonia)	126
Consumption	123
Diseases of the digestive system	168
Diseases of the urinary system	100
Diseases of the circulatory system	250
Diseases of the nervous system (apoplexy, 140)	295
Cancer (fifty of abdominal organs, eleven of breast, eight of uterus)	124
Accident and violence (suicide thirteen)	50
Unclassified, or no cause given	63
Old age	50

Of the diseases called zymotic ordinarily, there were 283 deaths among those over seventy, and 181 among those between sixty and seventy. Of these, however, the only noteworthy are those reported as typhoid, diphtheria and cerebro-spinal fever (which diagnosis is questionable) and perhaps malarial diseases. Without question diarrhœa may be placed, when occurring in the aged, as a method of failure of vital forces incident to senility rather than among those of zymotic character.

The same will be accepted without question regarding erysipelas. There remain but very few diseases occurring to those over seventy, or even over sixty years of age that belong to the zymotic group, and these should be accredited to the respective class.

In regard to the large groups of disease of the respiratory, digestive, urinary, circulatory and nervous organs however, it becomes a question whether in case of death through the medium of failure or disease of these organs of persons who have passed the age of seventy, the element of senility is not the predominant cause of death. And also, whether a fair estimate of the causes of mortality, of the movements of disease, and the healthfulness of localities would not be better reached by classifying all such as deaths from Old Age, rather than of deaths from diseases of one of these respective organs. Senile pneumonia, chronic bronchial catarrh, asthma, fatty degeneration and atheroma of the organs of circulation, apoplexy, cerebral softening, chronic gastric catarrh, senile constipation, prostatic hypertrophy are diseases, which occurring in old people depend more on changes in physiology, in tissue and function that come on in advancing age, than on the causes and conditions which produce them in the vigorous periods of life.

As to cancer, while it is more a disease of advanced life, the largest proportion occurring generally past the age of fifty, and constituting, as the statistics above given show, a considerable part of the causes of death in those dying still later in life, it would be better to retain it as a specific cause than to relegate it to the general class of deaths from senility.

The same is true of deaths from accidents and violence, which, at whatever age occurring, should be so recorded; although some of them, such as intra-capsular fracture of the femur, are special accidents of old age. It is also to be added, regarding both deaths from violence and from cancer, that the diagnosis is not involved in the obscurity which often attends those reported as being due to disordered functions or degeneration of the internal organs.

Regarding these deaths from violence, it is noteworthy that thirteen persons of those dying between sixty and seventy, committed suicide, while but one death so occurred in those past seventy. This has been generally observed heretofore in our returns of death, the prevalence of suicide between these advanced ages.

In general, then, regarding the classification, it may be said that deaths occurring past the age of seventy may well be placed under the head of "Old Age," except those of infectious or contagious diseases, cancer and violence. Of the 2,542 deaths above noted, with this understanding, all but a little over 200 would be thus recorded. There may be circumstances in individual cases, however, that would make them come more appropriately under the head of some distinctive class thus excluded.

SUMMARY OF MORTALITY FOR THE YEAR.

In the review of mortality that has been made, for the sake of comparing seasons one with another, the deaths of December, 1886, have been taken, and those of December, 1887, omitted. The following table shows the number of deaths and their causes, by months for the year, as published in the MonthlyBulletin:

Totals of mortality of the State by months.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping-cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal.	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
January	7,671	2,822	36.8	61	..	72	65	21	101	347	30	67	406	78	162.91	1,451	1,057	72	361	365	453	754	178	224	693	812
February	6,653	2,439	36.8	39	..	57	46	21	79	239	28	39	423	87	159.00	1,141	952	86	348	357	443	686	149	204	643	583
March	7,830	2,551	22.5	42	..	72	54	24	98	152	42	48	497	624	211.11	1,203	664	103	367	377	535	839	197	260	775	857
April	7,967	2,443	30.6	56	1	56	75	12	112	111	45	30	479	112	136.20	1,341	1,146	100	434	432	512	844	207	282	833	747
May	7,528	2,457	32.6	52	..	37	66	42	114	96	41	27	540	142	153.85	1,098	1,052	71	379	378	445	870	191	359	714	814
June	7,484	2,020	40.0	57	..	54	67	7	109	65	26	30	475	887	240.00	587	948	56	516	404	458	784	190	362	597	805
July	11,463	6,049	52.7	51	..	102	61	12	69	66	15	48	375	3,669	389.68	477	956	90	738	406	429	1,259	227	499	729	1,185
August	9,042	4,130	45.3	41	..	194	98	6	55	24	16	57	302	2,158	383.30	457	926	67	665	361	442	923	199	354	731	956
September	8,267	3,218	39.0	38	..	248	141	10	83	16	11	44	559	1,009	261.15	697	980	45	522	352	503	722	232	331	765	959
October	7,370	2,317	31.3	38	..	182	104	4	113	15	13	14	707	297	201.63	853	942	53	458	367	475	759	207	309	717	743
November	7,292	2,171	29.7	29	..	149	80	4	130	30	25	22	844	117	200.00	1,041	964	67	370	375	499	709	178	301	718	640
December	7,886	2,497	31.6	36	..	104	78	12	204	44	35	21	885	78	190.00	1,205	1,022	75	441	408	543	798	208	295	761	636
Totals for first six months	45,133	15,732	34.8	307	1	348	373	127	613	1,010	212	241	2,820	1,930	177.30	6,827	5,819	488	2,405	2,313	2,846	4,777	1,112	1,691	4,255	4,618
Total for last six months	51,320	19,382	38.8	233	..	979	562	48	654	195	115	206	3,670	7,328	280.00	4,730	5,790	397	3,194	2,269	2,891	5,180	1,251	2,089	4,421	5,118
Totals for the year	96,453	35,114	36.3	540	1	1,327	935	175	1,267	1,205	327	447	6,490	9,258	227.80	11,557	11.609	885	5,599	4,582	5,737	9,957	2,363	3,780	8,676	9,736

The only difference between these amounts thus given and their conclusions from those already detailed is that in the month of December. In December, 1886, there were 7,600 deaths reported, and the infant death-rate was higher than that of December, 1887, on account of a much larger death-rate from measles, to which reference has already been made. There was also a larger number of deaths from acute respiratory diseases. From diphtheria on the other hand the death-rate is considerably larger in December, 1887.

This table shows the relative mortality as it has prevailed month by month during the year.

MORTALITY OF THE STATE BY SANITARY DISTRICTS.

The State of New York presents a great diversity of topography, climate and modes of life, from that of the metropolis to that of the most sparsely inhabited rural regions. It has been found desirable therefore to divide the State into sanitary districts, which shall include in each conditions, so far as possible, identical. These districts and their boundaries have been given in former reports of the Board, but a repetition of them here will not be out of place. They are respectively designated as Maritime, Hudson Valley, Adirondack and Northern, Mohawk Valley, Southern Tier, East Central, West Central, and Lake Ontario and Western Districts.

THE MARITIME DISTRICT

includes the city of New York, all of Long Island, Staten Island and also Westchester county. It takes in all of the portions of the State bordering on the ocean and sound. Its population, according to the census of 1880, was 2,098,580; the cities of New York, Brooklyn, Long Island City and Yonkers have, as at present estimated, a population of about 2,280,000. The rural portions of the district contain most of the asylums, hospitals and like public institutions, which are largely filled from the cities. Most of the rural portion of the State has its death-rate, in summer particularly, augumented by the overflow of city residents.

THE HUDSON VALLEY DISTRICT

includes all of the counties on either side of the Hudson river except Westchester, to and including Albany and Rensselaer counties. Its population in 1880 was 750,143; its present estimated city population is about 250,000, the six cities in its limits having from 10,000 to 100,000 inhabitants.

THE ADIRONDACK AND NORTHERN DISTRICT

includes the northern section of the State, taking in the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. Its population, by the 1880 census, was 330,434; the two cities of Ogdensburgh and Watertown estimate their present combined population at 23,200. This district includes large areas of very sparsely inhabited territory; also over extensive tracts the level of ground water is high. As a sanitary resort for those having consumption and other diseases the death-rate of part of its territory is somewhat affected.

THE MOHAWK VALLEY DISTRICT

includes the counties of Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida. Its 1880 population was 280,800; in the cities of Utica, Rome, Schenectady and Amsterdam there are now about 80,000 inhabitants. It also contains many large villages and is a region of extensive manufacturing as well as farming industries.

THE SOUTHERN TIER DISTRICT

includes the seven counties along the southern boundary of the State; population in 1880 was 365,746, and its city population now, estimated to date, is about 65,000.

THE EAST CENTRAL DISTRICT,

somewhat arbitrary in outline, includes the counties of Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland, and with a population in 1880 of 354,320, has a city population in the one city of Syracuse now estimated at 78,000.

THE WEST CENTRAL DISTRICT

includes the counties of Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming. Its population in 1880 was 321,247, and in its only city of Auburn the present population is 26,000.

THE LAKE ONTARIO AND WESTERN DISTRICT

lies along Lake Ontario and includes Erie county also. Having a census population in 1880 of 578,700, its city population in the four cities of Oswego, Rochester, Lockport and Buffalo is now estimated at about 350,000.

In these eight districts, thus described, the deaths that have occurred during the year as recorded in the Monthly Bulletin, and the respective causes of death, are shown by the following table:

Totals of mortality in the several sanitary districts for the year.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping-cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
Maritime District...............	61,715	25,289	41.0	232	1	528	658	171	933	988	217	283	4,654	6,501	245.89	8,512	7,546	560	3,457	3,480	3,197	6,102	1,317	2,289	3,437	6,652
Hudson Valley District..........	9,895	2,864	29.0	135	..	270	79	4	109	49	25	41	579	706	201.20	946	1,331	107	642	326	957	955	233	413	1,187	801
Adirondack & Northern District,	2,969	710	24.0	36	..	71	11	..	28	16	19	20	147	189	179.50	236	366	32	169	79	182	253	112	109	626	268
Mohawk Valley District.........	4,359	1,089	25.0	33	..	89	14	..	32	25	8	21	294	321	192.00	364	485	33	274	156	319	474	165	173	712	367
Southern Tier District..........	2,513	580	23.2	19	..	76	33	..	24	6	11	8	111	178	186.00	233	236	31	175	57	169	292	74	140	415	225
East Central District...........	3,465	765	22.8	12	..	71	40	..	17	17	12	28	106	196	144.00	324	410	47	193	123	274	376	107	166	730	216
West Central District...........	2,474	457	18.5	8	..	47	24	..	..	4	12	11	76	144	131.40	192	285	23	149	94	162	256	94	101	594	198
Lake Ontaio & Western District,	9,065	3,370	37.0	65	..	175	70	..	124	100	23	35	528	1,018	237.50	750	950	52	540	267	479	1,249	259	389	975	1,017

The actual mortality and the relative proportion of deaths under five years of age and of deaths from zymotic diseases are shown by this table for the year. The influence of the aggregation of large populations in cities upon infant and zymotic mortality is very well shown. The Maritime district, predominatingly urban in population, is far in advance in both of these; next to it comes the Lake Ontario and Western district, with the large cities of Buffalo and Rochester; the Hudson Valley district is next, although considerably lower in these gauges of healthfulness, while the West Central district, with hardly any city population, is materially lower than all else. The almost *pari passu* relation of these two gauges of healthfulness is noteworthy at the same time.

For the sake of obtaining and showing the comparative prevalence of the principal diseases in the different sanitary districts, the following table has been prepared; it shows the number of deaths that occurred in each 1,000 deaths from all causes, from typhoid fever, diarrhœal diseases, diphtheria and consumption; and it also shows the same for 1885 and 1886, side by side with those of 1887:

Table showing the comparative prevalence of typhoid fever, diarrhœal diseases, diphtheria, and consumption, in the several sanitary districts for three years.

IN EACH ONE THOUSAND DEATHS THERE WERE IN THE—	FROM TYPHOID FEVER.			FROM DIARRHŒAL DISEASES.			FROM DIPHTHERIA.			FROM CONSUMPTION.		
	1885.	1886.	1887.	1885.	1886.	1887.	1885.	1886.	1887.	1885.	1886.	1887.
Maritime District	8.87	8.41	8.55	106.00	91.31	107.00	58.28	71.43	75.40	143.58	140.52	121.80
Hudson Valley District	27.85	27.28	27.27	62.63	63.48	71.30	64.87	61.93	58.50	144.83	137.00	134.85
Adirondack and Northern District	19.35	20.58	24.00	46.54	58.06	63.00	72.08	43.35	49.00	147.82	137.90	122.00
Mohawk Valley District	19.53	21.91	20.45	57.65	53.93	73.60	44.74	36.80	67.40	143.67	132.30	111.25
Southern Tier District	23.55	26.00	30.40	55.70	59.88	71.20	27.57	41.03	44.40	114.25	100.95	94.40
East Central District	19.64	27.45	20.50	59.74	51.20	56.60	32.74	40.34	30.60	139.93	131.52	118.40
West Central District	24.78	20.42	19.00	49.67	54.47	58.30	22.63	20.42	30.80	155.08	141.08	115.40
Lake Ontario and Western District	20.85	19.18	19.45	60.00	80.27	113.10	49.53	58.25	58.67	130.00	125.77	105.55
The entire State	13.27	13.47	13.75	90.80	80.97	96.00	56.06	64.48	67.24	139.76	137.66	120.35

Many deductions may be drawn, and facts learned from this exhibit of these four regularly and constantly recurring diseases. Typhoid fever causes with no great variation the same proportion of deaths year by year in the respective districts, but this proportion varies greatly in one district from another. In the Maritime, it is less than one-third that of the Hudson Valley, and is so uniformly through the series of years; the greatest variation year by year is found in districts having the smallest city population. From diarrhœa it is noted that in all the districts the death-rate is much higher than in the previous years, and the average for the State is fifteen deaths per 1,000 higher than in 1886. The same is true in part of diphtheria, the average for the State being considerably higher. From consumption, on the other hand, the proportion to other causes of death is lower, materially, than in either preceding year. Reference has heretofore been made in former reports of this Board to the notably low comparative death-rate from consumption in the Southern Tier district, it being only 94.40 per 1,000 deaths in 1887. The highest death-rates from this disease are observed to occur in the Hudson Valley, and the Adirondack and Northern districts.

This table shows the relative proportion of these diseases, one with another; of greater value would be an exhibit of the proportion of the various diseases to populations. This, however, cannot be shown with accuracy for the State, and is not attempted. There is still too much irregularity in the making of returns, as well as too indefinite knowledge of actual populations of reporting localities, to make such an exhibit of practical value. No census of the State having been taken since 1880, the populations then obtained, though of necessity used to some extent in the Monthly Bulletin, are doubtless often far from correct; at the same time the estimates of population made by respective local boards of cities and villages especially, are inexact and often probably too high. They are, however, the best that can be obtained.

Of eighty-seven localities, reports of whose mortality have been regularly printed in the Monthly Bulletins through the year, distributed all over the State, the aggregate estimated population is 3,500,000. The average death-rate of these eighty-seven localities for the year was twenty-three per 1,000 population. This includes all but three of the twenty-seven cities of the State, these three being Cohoes, Long Island City and Dunkirk. Excluding the cities, we have sixty-three localities, ranging in population from 3,000 to 10,000, and including townships as well as incorporated villages, the total population of which is about 375,000; the average death-rate per 1,000 population of these is 18.40. Of these 28.5 per cent were deaths occurring under five years of age.

A mortality of twenty-three per 1,000 inhabitants, annually, implies an average longevity of 43.74 years; a mortality of 18.40 implies a longevity of 54.35 years. Probably a reported mortality steadily below twenty per 1,000 inhabitants, which implies an average longevity of fifty years for the entire population, will be looked upon with scrutiny by those expert in vital statistics.

Of this deduction, however, our observation tells us some exception should be taken and the conditions surrounding the locality borne in mind. We have found that the death-rate does not increase with the population where the latter is steadily increasing. Without detailing evidence of this, we can refer to any of the growing cities, the mortality of which has been regularly reported in our Bulletin, for proof.

Nevertheless, there is no doubt that a death-rate that is constantly returned as twelve or fourteen or sixteen per 1,000 population must be erroneous, either by a failure to return all the deaths or by an over-estimate of the population. This will be found true of some of the returning localities.

On the other hand, some localities maintain an abnormally high death-rate. This is chiefly the case with towns in the vicinity of New York and Brooklyn, and is principally due to their receiving many feeble and infirm subjects, especially infants, from the city. It is difficult to adjust this.

Assuming that the population is at the present time 5,500,000, a death-rate of 18.40 per 1,000 annually would make the total number of deaths in the State 101,200. A death-rate of twenty per 1,000 would give a total number of 110,000 deaths annually in the State. It is not unlikely that this is not an over-estimate of the number that occur during the year.

The number of deaths of which a record has been secured in the Bulletin is about 96,500; in 1886 it was 86,800, in 1885 it was 80.400. The increase is mainly due to more complete returns. It is considerably below the estimate, but this fact is partly because there are a considerable number of death returns received every month too late for insertion in the issue of the Bulletin, and thus fail of publication. This number is from 250 to 500 each month; probably not less than 4,500 in the year.

RETURNS OF VITAL STATISTICS.

The following is the number of returns of vital statistics which have been received at the central office during 1887: Births, 46,857; deaths, 45,840; marriages, 22,966.

It is to be borne in mind in comparing these amounts with the foregoing that the cities of New York, Brooklyn, Yonkers, Albany and Buffalo are exempt from the provision of the law which requires the return of all vital statistics to this office.

THE PRESENT SANITARY CONDITION OF THE STATE,

At the commencement of the year 1888, needs but short reference after the foregoing. The tables given show the diseases and their degrees of prevalence month by month through and to the end of the year that is ended. The principal disease, and the one of widest distribution and of chief interest, is diphtheria. A glance at any of the tables shows this, whether by months or by years. Scarlet fever shows a moderate increase, but it is not widely distributed. Small-pox, which until toward the close of 1887, was practically unknown outside of the metropolitan center, and in fact in the entire country, has developed in various localities, but generally limited to one or two cases. It is, in January, 1888, in Albany where it appeared in December, in the town of Milo, Yates county, near Peekskill, in Springwater town, Livingston county, and Barton, Tioga county. Reference to these has been made earlier in this report. It is noteworthy that cases are reported from Pennsylvania and Iowa, and it is extensively prevalent in California. There will be no probable spread of the disease in this State, and the total of deaths from it will be but small. The total zymotic death-rate is low, and the general sanitary condition of the State fair. Local boards of health were never in better working order, nor composed so generally of intelligent citizens and officers, nor more familiar with, nor better instructed in, nor more heartily in sympathy with, as a rule, the admirable laws governing the health and empowering health authorities in this State; nor has the machinery of sanitation ever been in better practical working order than now. It is hoped that much of the incompleteness that, in spite of all effort, still remains will, during 1888, be done away with. That there is, and doubtless long will continue to be abundance of work for health workers to do in this State, a review of the exhibit given is sufficiently convincing.

RECOMMENDATIONS.

In the foregoing pages will be found many suggestions and recommendations which will appear so obvious as not to need repeating here. The following however are worthy of special prominence:

1. Investigations made by the State Board of Health into the actual condition of the schools of the State, emphasize the importance of systematic sanitary inspection by the boards of health within whose jurisdiction they are severally situated. The examination should cover provisions for lighting, heating and ventilation, over-crowding, water supply, drainage and sewage disposal, as well as precautions against contagious and infectious disease. This Board most earnestly renews its recommendations made in its last report with reference to schools, particu-

larly that the Superintendent of Public Instruction should have authority to compel school trustees to make improvements or repairs in school buildings for sanitary purposes, whenever the local board of health considers such necessary, and its judgment is supported by that of the State Board of Health. Equally important is it for the boards of health of places where summer resorts are maintained to make thorough examination of the condition of the drainage, plumbing and water supply, of these establishments, and be satisfied that they are safe to receive summer boarders. The importance of this work receives special confirmation by the report on the sanitary condition of Mt. Airy Hotel, in the appendix.

2. The number of nuisances that are caused by cheese factories, mill ponds, etc., in the pollution of the little streams and creeks in the interior, and in the propagation of malarial disease by the alternate flooding and uncovering of large surfaces, are so vicious and obstinate in character, and so threaten to work vast injuries to the people in the future unless promptly checked, that no mill privilege should be continued unless the holder of it can utilize the water power without alternate flooding and uncovering of the ground; and no refuse from cheese factories or other like establishments should be allowed to run into the little streams of the State, to render the water unfit for use by either man or beast.

3. The Board has found a number of nuisances connected with the canal system situated outside the blue line, the abatement of which does not come within the work for which the Superintendent of Public Works can expend the regular appropriation for his office, but which yet need attention. An act was passed in 1883, namely, chapter 291, providing for the prevention of disease or sickness caused by the overflow or discharge of water from the canals of the State into creeks or water channels, and appropriating $15,000 for the purpose. This act might be amended so as to include all sections of the abandoned canals, for the condition of which the State is liable, and a suitable appropriation made to carry out its provisions.

4. The act to confer upon the State Board of Health power to protect from contamination, by suitable regulations, the water supplies of the State and their sources, chapter 543 of 1885 has been already productive of much good in checking the tendency to defile the streams and lakes of the interior from which cities derive their water supply. The law, however, needs amendment in one particular, namely, that the power given to the county judge to approve the regulations made by the State Board of Health should be extended to any judge of the Supreme Court of the judicial district in which the water supply is located.

5. Although in most parts of the State the boards of health are established and efficient, yet occasionally difficulty is experienced in getting organization effected and prompt action taken when the appearance of contagious disease is reported and the utmost celerity is necessary to institute quarantine and prevent its spread. The Board, therefore, would renew its recommendation of last year:

That its organic law be so amended as to authorize its executive officer, where an emergency arises and the local board of health of the town or village in which the emergency occurs has not organized and appointed a health officer, to appoint a physician as acting health officer at the expense of the town or village concerned, who shall, until such time as a board of health for said place has been organized, as provided for in chapter 270, Laws of 1885, have and exercise, under the direction of the secretary of the State Board of Health, all the powers and duties of a board of health regularly appointed.

6. From examination of the quarantine station in New York harbor, as stated in the report made to the Governor on the tenth of December, the Board would recommend a complete renovation of the establishment. To formulate any particular plan or plans for this needed work would require a lengthy series of statements and computations. That much is required no one questions, and various suggestions have been made by different persons, each from his

own standpoint advising what appears best to him. The State Board of Health would prefer to recommend no stated plan, but knowing that the work required to place the quarantine station in the condition proper to insure its perfect working will be costly, and considering that the officers of the State are fully qualified to plan and advise for the renovation of the establishment, and thus save the expense of other experts, it would advise that the Health Officer of the Port of New York, with the State Engineer, be directed to prepare plans for such remodeling of the station as may seem to them necessary, and that these plans be submitted to this Board for approval. The submitting of plans thus prepared to the approval of the State Board of Health, brings them under the scrutiny of those who by their office are charged with the interests of life and health in this State, and who take special interest in preventive medicine, and make a constant study of means and measures tending to better conserve the health of the people.

It is, therefore, recommended that in case a bill is presented appropriating moneys for the repairs of the quarantine establishment in the harbor of New York, it so reads that such repairs are to be done upon plans and estimates made by the health officer of the port and the State Engineer, approved by the State Board of Health.

THOMAS NEWBOLD,
President.

WILLIAM E. MILBANK, M. D.
THOMAS S. DAWES, M. D.
ALFRED MERCER, M. D.
MAURICE PERKINS, M. D.
JOSEPH D. BRYANT, M. D.,

WILLIAM M. SMITH, M. D.,
Health Officer of Port.

CHARLES F. TABOR,
Attorney General.

LEWIS BALCH, M. D.,
Secretary and Executive Officer.

APPENDIX

TO

EIGHTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH.

REPORT OF THE EXECUTIVE COMMITTEE.

TRAVELING AND NECESSARY EXPENSES OF THE MEMBERS.

1886.			
Nov.	9.	Lewis Balch, expenses investigating Mt. Vernon water supply, amount	$16 35
		F. C. Curtis, expenses inspecting Home of Friendless, Poughkeepsie	9 46
Nov.	29.	Alfred Mercer, expenses attending meetings of the Board	73 21
		Frederick Carman, expenses attending meeting in New York	11 95
		George W. Cooke, expenses attending meeting of the Board	18 08
Dec.	3.	Lewis Balch, expenses attending meeting of Board in New York	14 50
	9.	Lewis Balch, expenses investigating the water supply of Jamestown	26 95
		Frederick Carman, expenses investigating Jamestown water supply	30 08
	18.	F. C. Curtis, expenses investigating diphtheria at Waldron	16 61
Dec.	31.	W. M. Smith, expenses attending meeting of Board	12 05
1887.			
Jan.	26.	George W. Cooke, expenses attending meeting of the Board	16 13
May	11.	Frederick Carman, expenses attending meeting of Board in New York	11 10
	16.	Lewis Balch, expenses on official business	44 85
		Alfred Mercer, expenses attending meeting of Board	39 93
June	2.	George W. Cooke, expenses attending meeting of the Board	29 25
		Maurice Perkins, expenses attending meeting of the Board	19 22

1887.			
June	13.	Thomas S. Dawes, expenses as State Commissioner	$5 00
		Thomas Newbold, expenses attending meetings of the Board	22 00
	24.	Lewis Balch, expenses on official business	13 35
July	20.	Frederick Carman, expenses investigating nuisance at Little Falls	3 46
Aug.	19.	William E. Milbank, expenses attending meeting of Board	11 70
		Total	$445 23

SPECIAL EXPERT AND TEMPORARY SERVICE.

1886.			
Sept.	30.	M. L. Edwards, indexing and typewriting	$76 53
Oct.	8.	Anna L. Mattimore, indexing and typewriting	43 82
	31.	Grace B. Winne, indexing	70 32
Nov.	6.	M. L. Edwards, indexing	168 00
	12.	Anna L. Mattimore, typewriting and tabulating	66 10
Dec.	2.	Emil Kuichling, services as sanitary engineer	52 66
	4.	Richard Prescott, services as sanitary engineer	25 00
	9.	A. L. Mattimore, typewriting and tabulating	56 00
		James T. Gardiner, services as consulting engineer	157 56
	16.	Grace B. Winne, indexing	164 08
1887.			
Jan.	3.	M. L. Edwards, indexing	234 40
	21.	Grace B. Winne, indexing	72 00
	29.	M. L. Edwards, indexing	24 00
Feb.	21.	M. L. Edwards, indexing	48 00
March	2.	Grace B. Winne, indexing	102 48
	30.	J. L. Fitzgerald, engineering	24 18
April	2.	David F. Lincoln, revising report on school hygiene	25 00
	5.	Grace B. Winne, indexing	65 52
	27.	M. L. Edwards, indexing	50 40
	30.	James T. Gardiner, services as consulting engineer	58 65
May	16.	Grace B. Winne, indexing	94 08

1887.			
May	24.	M. L. Edwards, indexing	$117 60
	27.	George W. Cooke, expenses attending meeting,	29 25
June	14.	M. L. Edwards, indexing	24 00
	16.	Grace B. Winne, indexing	73 92
July	11.	M. L. Edwards, indexing	48 00
Aug.	3.	Thomas C. Lawler, temporary assistance	80 00
	3.	M. L. Edwards, indexing	72 00
Sep.	2.	M. L. Edwards, indexing	100 80
	2.	Thomas C. Lawler, registering 100 pages delayed death records	100 00
	6.	Thomas S. Jones, Jr., for office assistance	26 00
	12.	M. L. Edwards, typewriting	35 45
	13.	Harper & Westcott, sanitary engineering service	10 00
	20.	Frederick Carman, expenses on official duty	9 00
	28.	Thomas C. Lawler, temporary assistance	130 20
Total			$2,535 00

SALARIES AND WAGES.

1886.			
Oct.	31.	Salaries for October	$1,041 65
Nov.	31.	Salaries for November	1,041 65
Dec.	31.	Salaries for December	1,091 68
1887.			
Jan.	31.	Salaries for January	1,100 02
Feb.	28.	Salaries for February	1,099 99
Mar.	31.	Salaries for March	1,099 99
April	30.	Salaries for April	1,099 99
May	31.	Salaries for May	1,100 02
June	30.	Salaries for June	1,099 99
July	31.	Salaries for July	1,100 02
Aug.	31.	Salaries for August	1,099 99
Sep.	30.	Salaries for September	1,099 99
Total			$13,074 98

PRINTING AND STATIONERY.

1886.			
Nov.	24.	Fergus Halpen, printing	$10 00
Dec.	2.	Van Benthuysen & Company, printing	377 25
		Weed, Parsons & Company, printing	193 02
	22.	Fergus Halpen, printing	19 00

DRAINAGE AND SEWERAGE.

REPORT

ON THE

Sanitary Condition of the Village of Tivoli, New York.

BY O. S. WILSON, C. E.

DR. LEWIS BALCH, *Secretary New York State Board of Health:*

SIR.—At your request I visited Tivoli on the seventh inst., and made a general examination of the sanitary condition of the village, and submit the following report on the same, but with especial reference to the drainage of various parts of said village:

The village of Tivoli comprises at least two separate settlements, one near the river and railroad, the other back about three-quarters of a mile on higher ground, and known as Madalin. The latter contains about four-fifths of the population, which for the village, is estimated at about 1,300. It is an old settlement, pleasantly located, with little manufacturing, and like many country villages along the Hudson, relies largely upon the rich farming country about, and the suburban country homes of city residents for trade and business. Many of the charming suburban residences are owned and occupied by families bearing names that have long been prominently connected with the history of the State and nation. Some of these residents are large land-owners, and make this their permanent home; and it may also be mentioned that the major part of the taxes are collected from these people, who are in a minority as regards numbers and votes, but who are drawn here by family association to spend a large portion of their lives seeking the comfort and health that rural places are supposed to promote. It is but natural that this portion of the population should feel especially interested in the good sanitary condition of their own property as well as that of their less wealthy neighbors.

SOIL.

In the upper village the soil is clay with a slight covering of loam in places. The upper clay is yellow, underlying which is blue clay of varying hardness. These beds of clay are about forty feet in thickness; perhaps more in places.

WATER SUPPLY.

The majority of the residents use water from shallow wells dug into the clay from twelve to twenty feet. There are three or four wells that penetrate the clay to the rock beneath, where water is found in abundance. Some of the residents who either have no wells, or are afraid to use the water from them, have filter cisterns, and use rain-water.

Along the eastern edge of the upper village runs White Clay Kill, a small stream with rocky bottom, that is nearly dry in summer, and could not be counted on for a source of water supply even if the village could afford the outlay. The main part of the village is on a nearly level plateau or ridge; but by going a short distance in any direction, ample fall is found for drainage. Most of the shallow wells are nearly dry during the late summer and autumn.

SEWERAGE.

Most of the privies have vaults, some of them connected with underground stone drains so that by connecting the overflow of the cisterns with the vaults some of the sewage is washed into the drains at irregular periods. It is estimated that about one-third of the privies are provided with boxes that are cleaned occasionally. In many cases these boxes are practically vaults lined with wood, the boxes not preventing the fluid contents from permeating the soil. Most of the houses have outside cesspools, that are supposed to connect with drains that may lead the slops, dish-water, etc., away to become a noisome stench on the land of their neighbor where the aforesaid drain has caved in or otherwise become ineffective.

CELLARS.

In most of the village it is necessary to drain the cellars to keep them free from water, as they are dug into the clay. There are a number of cellars that are never without water in them, or at least are never dry.

DRAINS.

All through the village drains have been run with no especial reference, seemingly, as to where they will end. The only rule followed appears to be to dig a drain so as to take the sewage their neighbor turns on their lot and their own and carry it on to the neighbor below or dump it into the street gutter, any way to be rid of it for the time. These drains are generally constructed with stone sides and covered with stone, a few are of vitrified pipe a part of their length. There is no regularity of size in the same drain. One man may lay a stone drain with a throat having a capacity of twelve or eighteen inches square; his neighbor below may decide an eight-inch pipe large enough, or he may dig a narrow, open ditch and allow it to become closed. In some cases privies are set over these drains. One of the residents told me that the water from the drain sometimes backed up through the overflow into the cistern so they could hardly use the water. One of the prominent residents deliberately built part of his house over one of the main drains ("T" in sketch), and has suffered sickness therefrom. The stench permeates the house when closed at night so as to be almost nauseating.

SLAUGHTER-HOUSES.

There are two slaughter-houses (X and Y in the sketch) quite near the center of the upper village, against which complaints have been made. They are certainly nearer to residences than seems necessary or judicious, still very little slaughtering seems to be done there now, and at the time of my visit there was no offensive odor nor were the surroundings such as to show carelessness. There was no evidences of any special preparation for being inspected and in justice I will state that they were in better condition, and showed more care, than most of the various causes of complaint I visited, considering the nature of the business carried on. It would doubtless be beneficial to slaughter farther from the village if practicable.

SANITARY CONDITION OF THE LOWER VILLAGE.

Although some of the wealthiest and most respected citizens live near this settlement, the majority of the residents are people who labor on the river or railroad, and are quartered along the narrow ravines and steep hillsides — anywhere they can get enough room for a small house and a pig pen. Some complaints had been recently made to the health officer regarding some privies and wells here, so a member of the local health board and I accompanied him on a tour of inspection. We found the same conditions and surroundings here that I have described above, and somewhat more aggravated, as the people are more crowded and live with less personal care. One of the leading residents has his well below and within less than fifty feet of two pig pens in filthy condition, two privies ditto and one barn. The well is about fifteen feet deep, and what is known as a "surface" well. One tenement-house contains nine families, who use three privies, all foul; the slop drain is stopped so that contents run under the house. A well that supplies the aforesaid families, and during the dry season most of the neighbors — as it "never fails"— is in a recessed porch and under the house roof. It is about ten feet to the surface of the water in the well; said well was cleaned out at the expense of some of the tenants last year, and the water is so foul now that the tenants "don't think it healthy to use." We found one privy out of a dozen inspected that was cleaned out a day or two previous, and was in fair condition for warm weather.

There is no doubt a special Providence watching over these people, or they would not now be alive. They will, however, aid in lengthening their career by having a general cleaning up of their privies and drains, and by clubbing together or otherwise obtaining their drinking water from deeper wells, so arranged as to "case out" all surface infiltration. The people could manage, without great inconvenience, by having one or two such wells centrally located. There must be about 100 innocent children in this community whose lives are thus endangered by careless parents and selfish landlords.

MADALIN DRAINAGE.

There are several places where the drainage is defective. I will deal with each separately and propose a plan for the remedy of the same. In the annexed sketch I have placed letters at various points rather than names, and shall refer to them by letter.

On Wall street, near the hotel, in front, under and back of the present post-office building, there formerly existed more of a depression than appears now, which took the storm water from wall street and the drainage of the houses about 200 feet west of it and all below on the north side of Mill street. A few years since the village authorities replaced the wooden bridge on Wall street with a pipe drain — which drain was continued under the post-office — and graded Wall street, throwing the surface water coming from the north into Mill street. The stone drain west of Wall street for 200 feet, more or less, emptied into this pipe culvert. Afterwards, to lessen the sewage below the post-office, the authorities raised the west end of this pipe culvert to nearly the street level and plugged the end, which prevented the sewage from the drains west of Wall street passing off readily. At present the sewage from said west drain rises to the surface of the ground, and after flowing on the surface a few feet enters the road culvert through a small opening. The stopping of this drain has been the cause of some ill-feeling that has not yet subsided entirely. The depression is the natural water-course, and must take more or less sewage, especially below the post-office.

It will be understood that there is very little summer flow of sewage; just enough water is wasted to keep the ground wet slightly. In ordinary soils it would soak away; here the water evaporates, leaving the sewage on the surface to create a stench. If there was a small running stream of water, and the drains were properly made and kept open, there would be no trouble. Where the drains are covered, and nothing is seen on the surface, they are so seldom flushed that they remain an elongated cesspool, poisoning what ground air there is, and doubtless polluting the wells near.

REMEDY PROPOSED.

From the west side of Wall street, along the course of the depression to the creek, at the Mill street bridge (O), is about 740 feet, with a rather uniform fall of about thirty feet. I have two suggestions to make for the improvement of this drainage.

TOWN WELL AND PIPE DRAIN.

One is to drill a well through the clay until plenty of water is reached, about 200 feet west of Wall street; over that well to place a windmill, and from the well lay an eight-inch vitrified sewer-pipe drain to the creek on Mill street, with which all drains along the route could be connected (with proper care to keep out all coarse material). Incidentally, a cistern for water for fire purposes could be placed near the two hotels (N and S), and the main business part of the village, and to be kept full from this well, and about a dozen residences could obtain good drinking water conveniently from this well. The village has now no facilities for fighting fires, not even plenty of water during the dry summer and autumn.

The other suggestion is for a

PIPE DRAIN AND STREET FLUSHING.

This would require a good sized catchment basin on the west side of Wall street, near the hotel barn (C), and a twelve-inch sewer-pipe drain from there to the creek, at (O), along the same line as before shown by line on sketch, keeping in the alley on Mr. Moore's property, and back to Mr. Affleck's house. The dotted line shows where the present drain differs from this route. The catchment basin should be about four feet wide and eight or ten feet long, and about seven feet deep, the pipe leaving it about three feet from the bottom. It should be covered, but opening enough left, by means of one-inch cracks on top, to intercept rain-water running in the street gutter during rains, to flush the pipe. As this flushing would be more or less irregular, it would require a larger sewer below to prevent complete stoppage than if a well was used, as suggested above. There would not be much difference in the cost of the two plans (leaving out the matter of the fire water reservoir), and I am inclined to think the well the better of the two.

If the latter plan was adopted the drains from the hotel (N) and the residences for 200 feet or more west, could drain into the catchment or receiving basin.

In both plans, the outlet would pass down Mill street, below Mr. Affleck's on the north side, and after passing just over the mill-flume, end just through the bridge abutment. When the creek was very low, a wooden shute could be suspended from the bridge that would deliver the effluent on the creek bed where there was most water.

MILL STREET DRAIN.

A drain from several buildings empties in the gutter on the south side of Mill street near (A) making a very unsightly and disagreeable nuisance on a small scale. This can be remedied by constructing a drain along the line (A B) crossing the street and connecting with the first mentioned drain at (J). Unless water can be provided to flush the drain, it would doubtless be better to lay a stone drain and provide a settling basin before discharging it at (J). If sufficient roof water can be provided for flushing the drain occasionally, a settling basin at (A) and a six-inch sewer pipe from (A) to (J) would work satisfactorily. The length is about 360 feet with ample fall.

THE ELLSWORTH LOT.

Some years ago a stone drain was made from (P) along the line (P Q) about a quarter of a mile southerly, into which various private drains emptied, including one from the hotel (S). This drain is probably stopped practically, or is too high, as it was necessary to cut off the drains to keep the sewage out of the cellar south of (E). The result is that the vacant lot (E) is covered more or less with sewage now, although it dries out by evaporation during the exceedingly hot summer. At present it is one of the worst nuisances to which my attention was called.

REMEDY PROPOSED.

The remedy is readily seen and not very expensive to carry out. It is to construct a catch basin near the south line of the hotel property (S) about five feet deep. About two feet from the top start a line of six-inch drain tile toward and into the south gutter line of the street, called New in sketch, thence along said line and across Mr. Stall's lot and on to the creek unless arrangements can be made for an open ditch at the lower end. This drain would average about six feet deep along the new street, but should be carefully laid and much care taken to obtain as even grade as possible. A very good way to lay tile drains is as follows: Dig the trench having the bottom on an even and uniform grade, the steeper the better. Place a narrow board on the bottom and lay the tile on the same placing the ends close together and as even sideways as possible, then lay over the tile enough straw (rye preferred) to make a thickness of half an inch when the trench is filled. The trench can then be filled with the material taken out, when the action of the sun on the surface and the tile below will dry out the soil, causing the clay to crack so that an ordinary rain on the surface will readily be taken into the drain in a remarkably short space of time even when the tile is four or six feet below the surface. There are few places where a smaller tile than six inch works satisfactorily for a long time, but with such a drain well laid and the end at the catch basin properly protected to keep sticks and such articles out it will last indefinitely and not become stopped. The receiving basin should extend two feet below the end of the tile and be covered and the sediment in the bottom cleaned out as often as necessary to keep it from entering the tile. The Ellsworth and other drains now emptying on this lot could be led to the same catch basin and find an outlet through the tile above referred to. The result would be the abatement of the nuisance now maintained on this lot and the means provided for reclaiming this land for building or garden purposes.

FELLER ICE-HOUSE DRAIN.

A drain said to be from this ice-house now empties in the gutter on the east side of Montgomery street opposite the new street. The effluent is something very objectionable wherever it comes from. It can be remedied by passing through a settling basin and then conducted into the tile drain mentioned above. All connection with such drains should have a place where coarse sewage and sediment can settle before leading the sewage into such a small drain. An oil barrel set in the ground with the outlet half way up one side and protected with a screen will answer a very good purpose and last several years. It will need looking after once a month or so, and the deposit removed and buried.

DRAIN AT FOOT OF CROSS STREET.

Opposite the south end of Cross street there are two road culverts that cross Broadway, carrying storm water on to the land of Mr. Ames where some of it lies in a depression near (I) keeping the ground wet for some time, to which Mr. Ames naturally objects.

This disposition of the water seems unnecessary, as Mr. Ames' sidewalk, and part of that in front of the Baptist church (V) should be raised, forming a levee or bank, and the road gutter on both sides of Broadway running westerly, cut deeper, which would allow all storm water to run along the street gutters until the ditch 500 feet or more west of the church is reached. It would be necessary to shorten the road culverts at (R) about four feet to give room to turn the water. This could be done without narrowing the roadway materially. Of course no sewage drains should be permitted to empty into the street gutters anywhere in the village.

A stone drain with throat two feet square, should be put in the gutter in front of the Baptist church to allow of carriages being driven up to land passengers on the sidewalk.

PINE STREET DRAINAGE.

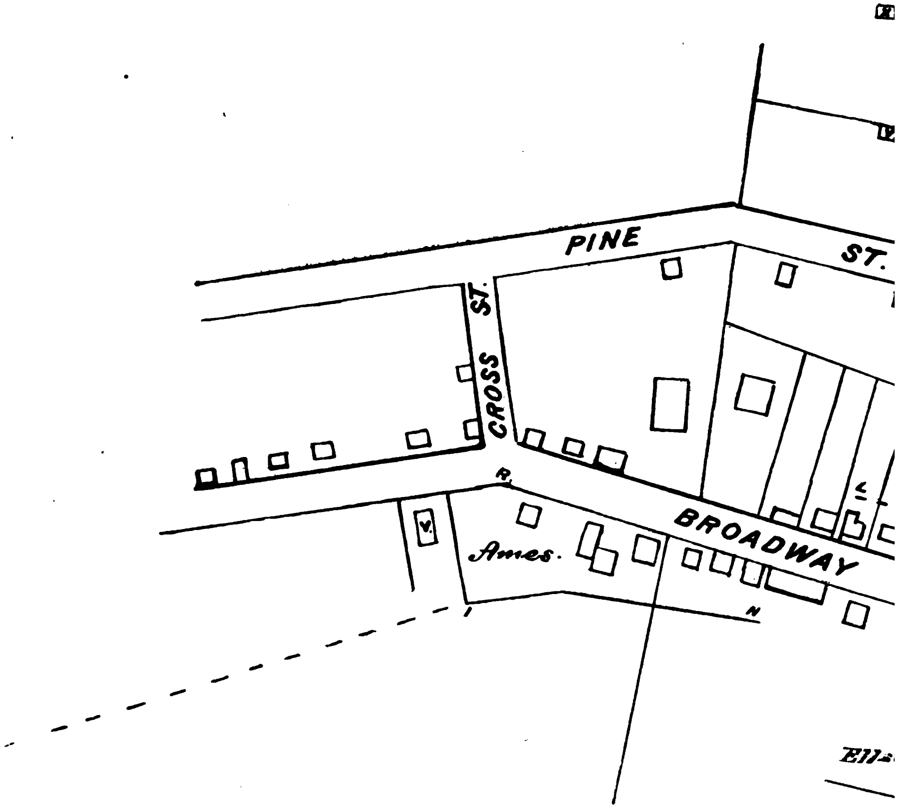
The eastern end of Pine street can be drained into Wall street by deepening the gutter at and near the corner about eighteen inches. The small pool in the Pine street gutter back of the M. E. church, should have a culvert across the roadway to the north, and the bottom filled eight inches or a foot to prevent water standing as it does now.

THE AMES DRAIN.

As mentioned above there is a slight depression (I) where sewage from an open ditch running from (N) settles. This can be remedied, after the road water is turned off this land, by running a six-inch tile drain through the adjoining land towards (K) until it can find an outlet, probably about 1,000 feet distant.

CONCLUSION.

I believe all the points to which my attention was called have been alluded to above, and provision made for remedying them. I do not flatter myself that all the means suggested are the very best and cheapest that might be adopted, but am certain that if properly carried out they will all remedy the various conditions now existing and forming so many disagreeable nuisances. The health officer, the local board of health, and the village trustees, all seem to realize the necessity of remedying these evils, and I dare say all the residents would also if the work could be done without any expense. I would call especial attention to the present system of wells as being especially dangerous to the health and lives of the people. The only way to readily obtain plenty of good water with minimum expense seems to be to drive or drill wells through the clay into the rock beneath. These wells should be "cased" through the clay to prevent the infiltration of surface water and not be common dug wells. A



Sketch of part of

Madalin

1887.

1 inch = 259 feet.

thorough system of subsoil or under-draining over the whole village would be an aid to the sanitary improvement, and would greatly enhance the productive qualities of the soil for garden purposes in soil so heavy as this is.

The inhabitants should sustain the health authorities in maintaining a thorough inspection of privies and drains, and in promptly putting the same in proper sanitary condition.

Respectfully submitted.

O. S. WILSON,
Civil Engineer.

June 9, 1887.

REPORT

ON THE

Condition of the Abandoned Chemung Canal in the Town of Elmira, Chemung Co., N. Y.

By **Emil Kuichling**, Civil and Sanitary Engineer.

Rochester, N. Y., *October* 10, 1887.

Dr. Lewis Balch, *Secretary of the State Board of Health:*

Dear Sir.— In accordance with your instructions of the sixteenth ult. to advise with the board of health of the town of Elmira, Chemung county, N. Y., as to the best method of abating the nuisance caused by a number of undrained pools in the prism of the abandoned Chemung canal in said township, and near the northern boundary of the city of Elmira, the undersigned promptly communicated with Mr. R. J. Stage, the secretary of said board, and arranged for an early inspection of the premises. The latter was duly made on the twenty-fourth ult., in company with Messrs. Jenkins and Stage, representing the local board of health; Messrs. Allen and Stevens, the superintendent and chief engineer, respectively, of the Elmira, Cortland and Northern Railroad, in behalf of that railroad company; and Messrs. Diven, on their own account, as interested land-owners. The examination was carefully conducted, and also included a series of levels, which were taken under my direction by Mr. G. A. Worth, assistant city engineer of Elmira, on the twenty-fourth and twenty-sixth ult., and the results arrived at are herewith submitted in the following:

The complaint of the board of health of the town of Elmira is, that by the construction of a railroad which runs along the general course of the abandoned Chemung canal in said town, and crosses and recrosses the prism thereof a number of times on apparently solid earthen embankments, several pools of more or less magnitude have been formed in the said prism, wherein the rain and other waters become stagnant and offensive, thus rendering these pools of menace and danger to the public health; also, that the E., C. & N. (Elmira, Cortland and Northern) R. R. Co., which leases and operates the railroad causing the trouble, has hitherto refused or postponed any action tending to secure relief, either by draining said pools or properly filling them with earth. This matter was first brought before the State Board of Health several years ago, and was made the subject of a thorough investigation in 1884 by Professor James T. Gardiner, then chairman of the committee on drainage, sewerage and typography, assisted by Mr. O. S. Wilson, C. E. The reports made by these gentlemen at that time were duly submitted, and will be found printed in full on pages 216–226 of the Fifth Annual Report of said Board, to which particular attention is now invited. It should be remarked that since Professor Gardiner's investigation, the dangerous nuisance caused by the discharge of the sewage from the State Reformatory into the canal prism, has been satisfactorily abated by the construction of a new sewer connecting with the sewerage system of the city; also, that within the city limits, the abandoned canal has, to a large extent, been filled up with earth, ashes, etc., so that now no complaint in regard to these two elements is made. Just beyond the city line, however, the condition of the canal prism still remains as described fully by Messrs. Gardiner and Wilson in their reports above mentioned, notwithstanding the efforts of the local health authorities to have the same improved in some manner by the railroad company. Failing to obtain any concessions, the board of health of the township finally brought the facts before the grand jury in November, 1886, in consequence of which the said railroad company was indicted for maintaining a nuisance. The indictment was tried in June last and a conviction obtained; but a stay of sentence was granted in order to give the railroad company an opportunity to abate the nuisance caused by the existence of the undrained pools. The company, thereupon, commenced to deposit earth in the old prism with the view of filling it up, but was forbidden to continue the work by General A. S. Diven, the owner of a large tract of land between the canal and Newtown creek, under penalty of an injunction, on the ground that such refilling of the canal prism would throw upon his lands much water now intercepted by the old canal. The railroad company was, therefore, placed in a very awkward position, being threatened on the one side with a sentence of the court for maintaining a nuisance, and with an action for injunction on the other side if it attempted to abate the nuisance. In this dilemma the counsel of your Board is again sought, before all parties become involved in further litigation.

The pools in question, as well as the natural and artificial water-courses in the locality, all appear to be correctly represented upon the larger of the two maps appended to Mr. Wilson's report aforesaid; the relative elevations, also, of the water surfaces at the several points indicated upon said map between Lake Eldridge and Newtown creek, have been carefully tested by Mr. Worth and myself, and the figures recorded by Mr. Wilson were found to correspond closely with those obtained by us, therefore it will be unnecessary to make a new diagram or map for this report, especially since all parties in interest are provided with copies of the map and document mentioned. These pools having been declared to be public nuisances, the problem presented for consideration is, how can the same be abated with the least amount of damage and expense.

The surface of the ground lying west of Newton creek, between the city line and the highway, called "Gypsy lane," is generally quite flat, and with a slight inclination towards the creek. Between the latter and the old canal, a few low ridges or prominences occur; while west of the canal considerable areas of nearly level land are found, some of which appear to be of a marshy character. Nearly midway between the city line and Gypsy lane, this district was originally traversed in an easterly direction by a natural water-course, or brook, which conveyed the discharge of Lake Eldridge, together with the drainage from the adjacent territory, into said creek. This water-course was formerly very tortuous, yet well-defined; and when the Chemung canal was constructed it was carried across and under the bottom of the prism by means of a "diving" culvert or an inverted siphon of masonry, the remains of which are still discernible. At the present time, however, the culvert appears to be obstructed, since a portion of the water coming from the lake seems to flow directly into the canal prism. The lands between the canal and Newton creek, through which the said brook flows, are owned by General A. S. Diven, who, for his own convenience, at some time subsequent to the construction of the culvert, caused the water to be diverted into the rectilinear ditches, or artificial channels, shown upon Mr. Wilson's map, thereby affording both a better outfall and also leaving a portion of the old channel to serve as a fish pond.

To convey some idea of the general slope of the land, and the relation thereto of the old canal, the following figures are submitted: First, The distance from Lake Eldridge to the junction of the aforesaid brook and Newtown creek is about 4,000 feet, measured in a straight line, while by way of the present channel it is about 4,700 feet. The difference in level between these points, or the fall in the brook, is only about four feet, more or less, depending mainly upon the stage of the water in the creek. The levels of Mr. Wilson give for this fall 4.4 ft., while those of Mr. Worth give 3.9 ft., the difference between the two sets of figures being attributable to different stages of the water instead of to error in leveling. Second, From the canal to the creek, the distance, measured along the present course of the brook, is about 2,400 feet, and the difference in level between water surface in canal and creek is only about 3.4 ft. the water in the canal, moreover, is about three and one-half feet deep, with several feet of soft mud in the bottom, so that practically the canal bottom and low water surface in Newtown creek are on the same level.

It will accordingly be seen that the canal cannot be fully and thoroughly drained into Newtown creek, unless the mill dams and water privileges on the latter, below the mouth of the brook, are removed, and the channel of the creek itself considerably deepened. Furthermore, no other outfall than the said brook can be secured, except at enormous expense, which the railroad company would doubtless refuse, until compelled thereto by the court of last resort. To avoid the cost of draining, the company undertook to refill the abandoned prism with earth, but stopped this work for the reasons above mentioned. The argument of General Diven against the refilling of the canal with earth is, that the same should be drained southerly, for a distance of several miles, and through the city of Elmira, into the Chemung river; or else into the sewers of the city, which discharge into that river; and thus relieve his low lands from the surface and subsoil waters heretofore intercepted by the canal. Another reason is, that by the filling of the canal with earth, the water would necessarily be displaced, and thence overflow upon his lands; and lastly, that by such a refilling, the subsoil water of a very permeable or gravelly stratum, alleged to exist near the surface of the ground, and to extend for considerable distances north and west of his lands, and now intercepted by the canal, would filter or percolate through the newly deposited material, and thus keep his low lands constantly wet, thereby causing them to become valueless for agriculture.

In reply to these arguments or objections on the part of General Diven, it may be answered that the drainage of the canal prism into the Chemung river is at the present time entirely impracticable, for the reasons that through the city of Elmira the abandoned canal has long since been refilled, almost entirely, and that even if the same had not been so refilled, there would not have been sufficient fall to accomplish the purpose, unless the waters were conveyed in a smooth and large conduit. The cost of such an undertaking, moreover, would be such as to render it out of question.

To drain into the city sewers is likewise impracticable, since all of those in the northern part of the city are much higher than the surface of the water in the canal. Even the large sewer from the reformatory, which I am informed was laid at the lowest possible elevation or depth, and which is the nearest to the pools under consideration, was found by our levels to be on its bottom, or invert, two and thirty-eight-hundredths feet *higher* than the surface of the water in said pools, and about 2,200 feet distant from the foot of the long pool opposite General Diven's land. Accordingly, unless the water be lifted by pumping, the drainage of the old prism into the sewers is impossible. With regard to any damage by overflow, in consequence of displacing the water in the prism by a refilling of the same with earth, it need only be remarked that no such calamity is practically possible, inasmuch as the new material would absorb a large proportion of the water directly, another portion would soon evaporate, and the remainder could be pumped out, if necessary, into some other outlet; the process of filling, furthermore, requires considerable time, even when the material is delivered by full train-loads, and the railroad company's officers would hardly venture to endanger the road-bed by operting in such a manner as to cause an overflow. The objection, again, would apply only in the case of the relatively small pools lying between the lands of General Diven and the N. Y., L. and W R. R. crossing and not to the long pool, because the latter is provided with an overflow in the form of two twelve-inch pipes, which pass side by side under the railway track and discharge into the head of the ditch cut through General Diven's lands. The bottoms of these pipes are only a few inches below the water surface in both canal and ditch, and the rise of the water surface in the former, due to the dumping of an ordinary train-load of earth therein, would be hardly appreciable. The water so displaced would gradually escape through said pipes in limited quantity during each second of time, while but a few train-loads of earth would probably be delivered during the day. It can, therefore, be safely asserted that the pools can all be readily and economically refilled with earth without causing any appreciable rise in the water of the ditch, or diverted brook, and hence also without any overflow of the low lands between the canal and Newton creek. Finally, in relation to the matter of greater percolation of subsoil waters with the canal refilled with earth than in its present state, filled with water, little need be said, since the objection cannot be regarded as valid. The facts are that from the foot of the old lock at Gypsy lane southerly to the old diving culvert, substantially the whole of the original canal prism is filled with water to a depth of at least three feet — this water being derived principally from the outlet of Lake Eldridge and from some springs in the canal bottom at the said old lock. It is also probable that there are a few smaller springs in the prism at intermediate points, which rise from a stratum of swamp muck of considerable thickness found on or near the bottom of the canal and extending some distance on each side thereof. There does not, however, appear to be any stratum of of water-bearing gravel, sand, or other highly permeable material exposed to view along the banks of the canal, or in excavations on adjacent lands; and hence no serious inflow of subsoil water from such a source can reasonably be anticipated. If such a stratum, of appreciable magnitude, existed at some point *above* the canal bottom, it might be readily discovered; and on the other hand, if the same were only a little *below* said bottom, it would find no outfall, because the surface of ordinary low water in Newton creek is practically on a level with the canal bed; furthermore, the water held in the prism would, in either event, exhibit much greater fluctuations of level than have heretofore been observed. The discharge of the two twelve-inch overflow pipes above mentioned, as well as the observed inflow from the springs at the old lock, are both comparatively small quantities, and the low grounds adjacent to the canal on General Diven's estate do not appear to be saturated to such extent as to preclude their cultivation; the volume of water in the prism, also, is but an insignificant fraction of the quantity that an extensive permeable stratum, of the character alleged to exist here, would deliver into an intercepting ditch after a period of heavy rainfall; therefore, it may safely be assumed that no damage from subsoil water would follow if the old prism were entirely refilled with earth, since the passage or percolation of such water through the newly-deposited material and the railroad bank together will manifestly be smaller thereafter than it is at present through the latter alone, There is, moreover, a ditch at the foot of the old towing-path, or present railroad bank, which serves to intercept any such percolation and prevent it from flowing upon General Diven's lands. Should any difficulty arise, this ditch could easily be deepened and enlarged to any desired extent, and thereby an adequate guarantee against flooding said lands would be afforded. It must also be remembered that since the abandonment of the canal the quantity of water to be dealt with is considerably smaller than formerly, when a large volume was constantly delivered into the prism to supply the summit level at Horseheads; and that no diversion or interception of the subsoil water can reasonably be demanded.

Upon presenting these views to the several parties interested and above named, the most formidable of the objections were withdrawn, or else modified to such extent as to warrant the belief that the railroad company would at once proceed to give the relief demanded by the local board of health. The work agreed upon, and herewith recommended to be performed by said company, consists of the following items:

First. The artificial channel of the outlet of Lake Eldridge, from the canal or railroad to General Diven's lane, and the natural channel thereof, from said lane to Newtown creek, to be thoroughly cleaned, deepened and enlarged, wherever necessary, and to be so maintained.

Second. The long pool from Gipsy lane southerly to the point where the railroad bank crosses the old canal prism to be gradually reduced in width by filling in with earth on the west side of the present track, until it becomes a simple ditch having its outlet at the aforesaid artificial channel.

Third. All of the remaining pools in the prism, between said railroad crossing and the continuation of Baldwin street, near the crossing of the New York, Lackawanna and Western Railroad, to be filled up at once with earth or other suitable material, at the same time making ample provision for the removal of surface-drainage waters to some convenient outlet.

By reducing the width of the long pool aforesaid, and allowing the discharge of the spring at the foot of the old lock just north of Gypsy lane to flow continually through it, the water can be maintained in a proper sanitary condition, and the cost of subsequently taking care of the ditch will become vastly dimished. The railroad company also gains thereby a large area of land, which will be available for additional tracks, etc. The cleaning, deepening and enlarging of the artificial and natural water-courses through General Diven's lands will materially benefit the same, in consideration of which the right to discharge therein the comparatively trifling amount of spring and intercepted drainage waters from the abandoned canal, without further litigation, may fairly be granted to the company. For the filling of the smaller pools several thousand cubic yards of material will be required, which the company can cheaply obtain and transport from some convenient locality on the line of their railroad, while but a relatively small sum need be expended in the preparation of the outlet ditch or channel already described. The total cost of the work above specified, exclusive of the refilling of the long pool, and which the local board of health do not at present insist upon, will probably not exceed $2,500, and it is hoped that the company will find it to their interest to make the needed improvements at an early day without being forced thereto by process of law.

Respectfully submitted.

EMIL KUICHLING,
Civil and Sanitary Engineer.

REPORT

ON THE

Sanitary Inspection of the Village of Port Chester, Westchester Co., N. Y.

By Chas. C. Brown, C. E.

Schenectady, N. Y., *December* 6, 1887.

Dr. Lewis Balch, *Secretary State Board of Health, Albany, N. Y.:*

Dear Sir.—In accordance with your letter of December 1st, I proceeded to Port Chester, Westchester county, arriving there on Saturday morning, December 3rd. I met the members of the local board of health and other citizens, and inspected numerous parts of the village under their guidance.

I found a village of perhaps 5,000 inhabitants with a system of water-works, which appears to give good satisfaction, and a system of sewerage in process of construction. The Highland avenue system, emptying into the Byram river at A (see sketch accompanying) is finished (marked with full lines on map), and the Westchester avenue system, emptying into the river at B, is in process of construction (marked with dotted lines on map). Byram river is a small stream, is a tidal river, navigable for sloops and small vessels. Its mouth is about a mile and a half below the town. I am not certain that the position of the outlets is such that they will not create a nuisance, but better outlets could hardly be obtained without more expense than the village could well afford at this time. It will probably not be difficult to abate the nuisance, should any be caused in future by an intercepting sewer, or otherwise.

There have been several private sewers in use in the village for some years, which have become nuisances in greater or less degree, and threaten to become greater nuisances in the future, if their use is not stopped. I inspected, so far as was possible, the following:

1. A blind ditch is said to run along the rear of houses on Westchester avenue between Exchange place and Haseco avenue, and to

receive sewage from them. It crosses Irving avenue, runs under the play-ground of the new school-house, and comes out with quite a stream of water just below Haseco avenue, at the point G on the map. Most of the sewage is by this time removed from the water, but there are still quite perceptible traces of it. This stream finds its way to the pond called Brown's pond, which was formerly used as an ice pond. Its use has most properly been abandoned, and the dam restraining it has been partly torn away. This leaves a low, wet area surrounding a small pond which would not have a healthful tendency, and is said to have engendered some malarial diseases among the teachers and pupils at the public school near the corner of Irving and Haseco avenues. There are but few houses in the immediate neighborhood, and most of them are new. The stream receives some accessions from the north, and runs in a southerly and easterly direction to Smith avenue. From this point across Pearl street it is arched over. It is open from Pearl street nearly to Main street, with the exception of the culvert under the railroad. It runs under the buildings on Main street, and under the street, entering the river at the point E. It receives at present the sewage from the sewer on Fountain and King streets, the outlet to that system (called the Westchester avenue system) not being yet finished. It also receives sewage from some houses and stores on Fountain and Main streets.

The houses on Westchester avenue between Exchange place and Haseco avenue can, with perhaps one or two exceptions, connect with the sewers on Westchester avenue or Haseco avenue when they are completed, and this should be done. The new houses on Haseco avenue, northerly from Irving avenue, cannot be drained thus, and they should use cesspools until such time as the population in this neighborhood will justify the construction of a sewer for them. The sewage from Fountain street and the houses which drain into the stream on Fountain and Main streets should be turned into the main sewer as soon as possible, and the use of the stream for any such purposes prohibited. At present there are but two buildings on the stream above Fountain street. The outlet to Brown's pond should be cleared out and deepened to take all the water out of it, and a sufficient channel made through the pond.

2. Five or six houses on King street run their sewage into the street gutter. It runs thence through under the railroad, receives some surface drainage from Willet street, and runs thence across an open lot, under buildings, and under Main and Adee streets, emptying into the river at D. It receives sewage from several houses and stores on Main and Adee streets, in addition to its original supply.

At times of extreme high tide it is apt to be backed up and to overflow into cellars on its course.

The use of the stream should be prohibited, and connection made with the nearest sewers, viz.: Those on King and Willet streets for the upper end, and that on Main street for the lower. Catch basins in proper places will take the surface drainage and do away with the stream entirely. This should be insisted upon, especially if the improvement next mentioned is to be made in the best manner.

3. A large part of the inlet of the river into which both the above streams empty is above low water, so that it is bare for a large part of each day. The two streams above mentioned, and twelve or fifteen privies on the banks of the inlet, and all the refuse from the stores on Main street which back up on this inlet, unite to make a nuisance of this place, which is great at this season of the year, and must be almost unbearable in summer time.

The recommendations made above regarding the streams, will do something towards abating the nuisance. The privies should be abolished and connection made with the Main street sewer. But the nuisance cannot be entirely abated until the inlet is filled up, leaving sufficient arched channel to deliver the water from the stream E into the current of the river. The flow from this stream must be quite large in times of freshet. The evidence goes to show that a culvert of five feet height will be ample for the purpose. The stream D should be closed up as recommended above. This inlet is the greatest nuisance with which the town is troubled, and it is situated in the midst of the business part of the town, so that it must be almost unbearable at times. Prompt and decisive measures should be taken to abate it. I understand that owners of part of the property on the inlet are discussing the project of filling it for dock purposes, so that it should be quite an easy matter to set going.

4. A private sewer runs back of houses on Highland avenue above the railroad and thence down that avenue, across Main street, and down to the river at C, just below Church street, receiving sewage from most of the houses along its course. The sewer is rectangular in section on Highland avenue, at a point opposite A. J. Peck's, where I had an opportunity to examine it; is about eighteen inches square, and built of rough stone laid dry, so that the ground through which it runs is becoming thoroughly saturated with sewage. Moreover, its position in the street is such that it interferes with proper connections with the new sewer. Mr. Peck's pipe connection with the new sewer must run through the middle of the opening of the old sewer.

The use of this sewer should, therefore, be discontinued, and connections made with the Highland avenue and Main street sewers.

5. Three or four houses on Willet avenue near Horton avenue drained formerly into the gutter, and thence into an open cesspool on the easterly side of Willet avenue. This became a nuisance and was filled up. The sewage now stands in an underground culvert and in the ditches, and will become a nuisance in course of time.

These houses can, I think, connect with the sewer on Horton avenue. If not, they should use cesspools until that section of the village is supplied with a sewer in its proper place.

6. On the southerly side of the village is located the bolt works, from which runs a sewer about 1,200 feet long. Into this sewer drain also fourteen dwellings of the operatives and others. The outlet to this sewer is close to the highway, and is at times a source of some bad odor, which is not pleasant to passers by. This sewer empties, I think, into the small creek which enters the inlet at J, perhaps half a mile above that point and at about the level of high tide.

It will probably be sufficient to continue the pipe a hundred feet or so down the stream, or far enough from the road so that the oder will not reach it. This district will be included in the sewerage system at an early day, I understand, when the matter can be permanently remedied.

I also inspected more or less thoroughly a number of minor nuisances present or prospective, among which were the following:

Near the corner of Locust and Horton avenues (at F on map) is a stable in which are kept three or four horses and a cow. Adjoining is a privy, a space used for washing carriages, etc., and a manure pile. The stable next east is lower, and complaint is made that the drainage from the first stable, privy, etc., finds its way into the basement of that stable, to the extent at times of filling it a foot or two deep with dirty, ill-smelling water. The nuisance could be readily abated by a water-tight floor to the first stable mentioned, and a connection with the sewer on Horton avenue to carry off the liquid refuse, etc.

Along both sides of Smith avenue (H on map) are swampy places, which were nuisances before the building of the King street sewer, as they were part of them receptacles for the sewage of dwellings which now drain into that sewer. It is possible that they are not entirely healthful at present. They can be readily drained by grading ditches down Smith avenue to the little stream near Irving avenue.

The school-house at the corner of Irving and Haseco avenues should be connected with the sewer as soon as it is completed. At present the privy vaults are flushed by the rain-water from the roof into a cesspool in the yard. The arrangements are rather defective, so that the whole vault is not flushed at any time, and almost not at all in winter when most in use; and sewer gas may be conducted from the cesspool to the vault, and thence up the rain-water leaders. As these leaders are full of holes, this gas may find its way through windows, etc., into the school-rooms.

On Oak street are several wet cellars, which can be readily drained into the sewer. Many houses in the village are not supplied with sinks or connections with the sewer. Wherever the management of slops and liquid refuse is such as to create a nuisance, connection with sewers should be made.

I wish to emphasize one point upon which there seems to be much ignorance in the village — the proper tapping and ventilation of all connections with the sewer. Every house connection should have a good trap well laid. The trap should properly be outside of the house foundation line, and should have a ventilating pipe on the side next the sewer, which should lead up high enough to keep the sewer gas from entering the house. If the trap is next the house this pipe should run up four or five feet above the roof, and end at least ten or fifteen feet from a chimney or other opening. If the trap is at some distance from the house, say under the curb-line of the sidewalk, the the ventilator may end near the surface of the ground, its upper end being high enough and properly protected to keep it from getting stopped up. The necessity of such traps and ventilation cannot be too strongly urged, and should be a part of the plumbing regulations regarding sewer connections.

The present village "lock-up" is near the point E, and is evidently not in a healthful location. I was unable to inspect its interior.

It is proposed to build a new "lock-up" on Main street, near William, I believe, three sides of which are bounded by solid rock. Thorough ventilation and heating arrangements will be absolutely necessary to prevent dampness and to give pure air, and perfect drainage should be arranged for. The arrangement for light will probably be defective. A close inspection of the plans with these four points in mind should be made and may save the village a suit for damages for detention in an unhealthy place.

At the suggestion of the president of the village I made what little inspection of the sewers under construction was possible with the limited time at my disposal. I am disposed to think that the sewers are being constructed fairly according to contract, with the exception that sufficient care is not taken in bedding the cement pipes. The specifications lay special stress on this point, but the only tamping

under the pipe is done with a shovel, and the fact that a number of pipes had to be dug up and new pipes laid because they had cracked, would show that the tamping was not sufficient. Much of the work is in wet ground and the pipes are laid on boards to give chance for the cement to set. The pipes thus rest on their flanges, and especial care is necessary in tamping under the pipes, especially with the larger sizes, to take the weight off the flanges and prevent cracking. The positions of catch basins are not always the best possible, whether from error in plan or because the streets are not yet graded. At the northerly corner of Highland avenue and Main street, a catch basin would take much water that comes down Main street from the north, and prevent some flooding of that block of Highland avenue. the catch basin on the other corner takes only a small part of the water at this place. A similar criticism would apply to the corner of Marvin place and Highland avenue from which comes water to increase the flood on that block of Highland avenue. When the private sewer is abandoned some additional openings into the sewer will be necessary. The same may be said in the case of other private sewers.

Respectfully submitted.

CHAS. C. BROWN, C. E.

REPORT

ON THE

Sanitary Inspection of Harbor Brook, and the New York State Asylum for Idiots, at Syracuse, N. Y.

By Emil Kuichling, Civil Engineer.

Rochester, N. Y., *December* 2, 1887.

Dr. Lewis Balch, *Secretary of the State Board of Health:*

Dear Sir.— In accordance with your instructions of the fourteenth ult., to examine into the pollution of a small natural water-course, called Harbor brook, in the city of Syracuse, N. Y., by the discharge of sewage from the New York State Asylum for Idiots, the undersigned at once communicated with Dr. Alfred Mercer, of Syracuse, and member of the State Board of Health, and arranged for a thorough inspection of the premises complained of to be made on November 22, 1887. On that day, therefore, Dr. Mercer and the undersigned devoted our entire time to an examination of the problems presented, and after a careful consideration thereof, the undersigned begs leave to submit herewith the following:

The New York State Asylum for Idiots is located upon the eastern slope of the range of hills in the western part of the city of Syracuse, and about one and one-half miles south of the head of Onondaga lake. The asylum grounds cover an area of about sixty-five acres, immediately adjacent to Burnet park, the most of which is high land, overlooking the city and lake; and at a number of points in this area the buildings constituting the asylum and its adjuncts have, at different times, been erected. The principal group of buildings, which are clustered about the original structure, facing the western extremity of Seymour street, accommodates at the present time an aggregate of about 450 persons, although according to the statement of the superintendent, Dr. James C. Carson, room could be made for from twenty-five to fifty more. An abundant supply of water from the city water-works is furnished to this group of buildings, which are all provided with water-closets, and the resulting sewage therefrom is conveyed through two lines of twelve-inch pipe sewers down the hill-side into a small natural water-course called Harbor brook. The mouths of these sewers are plainly visible at points a few rods south of Seymour street, and are also distinctly indicated by a strong discoloration of the water in the brook. As to the quantity of such sewage, no definite figures can be given, since the water supply is not metered; but as the water is used without stint, it is fair to assume that the consumption is at the rate of not less than eighty gallons per head per day. The sewage flow may, therefore, be estimated at about 36,000 gallons per day, one-half of this being discharged in not more than eight hours, thus making a maximum flow of 37.5 gallons per minute, and an average flow in twenty-four hours of twenty-five gallons per minute.

The small brook into which this volume of raw sewage is discharged from the asylum buildings, flows in an open channel through a well-settled district of the city, for a distance of nearly one and one-fifth miles, between Seymour street and School street, and thence through low grounds three-fourths of a mile further, into Onondaga lake. The total fall in this distance of nearly two miles is about twenty-six feet, when the lake is low, thus imparting a fair velocity to the water or sewage. This fall is, however, not uniform throughout the entire length of the channel, in consequence of which a series of relatively sluggish pools, alternating with slight rapids, are formed. In these pools considerable deposits of sewage matter occur in dry seasons and by the decomposition of the same it is alleged that exceedingly offensive exhalations are given off, often polluting the atmosphere for appreciable distances on either side of the stream. Relief is obtained only after heavy rain storms, by which the volume of the brook becomes swelled sufficiently to scour away the accumulations of organic matter into the lake; and, therefore, during the intervals between such rains the condition of the inhabited districts adjacent to the brook may justly be regarded as unsanitary or unwholesome.

It should also be remarked that Harbor brook is the natural outfall for the drainage of a relatively large area of hilly territory outside of the city limits, and that it reaches the mouth of the asylum sewers as a small, but clear and sparkling, stream of water, fringed with healthy vegetation and free from any signs of sewage pollution. At the time of my inspection, the flow at this point was unusually scanty in consequence of a long protracted drought, being approximately 200 gallons per minute, or about eight times the volume of sewage from the asylum. Above the sewers, the channel is about six feet wide on bottom; but, below the same, it somewhat becomes wider to accommodate the increased discharge, and the vegetation on the margins is such as is usually found in foul streams. The filthy appearance of the water, together with deposits of organic matter on the bottom and sides of the channel, afforded ample evidence of the presence of sewage, even if the existence of the aforesaid sewers were unknown. Following down the channel, the water gradually became clearer in proportion as the matter held in suspension was afforded opportunity to settle in the sluggish portions of the stream, yet a noticeable odor was found in the water even after a flow of about one mile. No other sewage than that from the asylum has hitherto been allowed to be discharged into the brook, in spite of repeated efforts to make it the outfall for contemplated sewers in a number of streets in the southwestern part of the city; and as experience has demonstrated the inability of the brook to remove the sewage from the asylum alone, without giving rise to offensive odors along its course to the lake, it is evident that the restriction has been wise and proper.

In consequence of the rapid growth of population in this district of the city, however, the demand for sewerage has latterly become more urgent, and the question is now pertinently asked why the citizens should be forbidden to discharge sewage into Harbor brook when the authorities of a State institution have already polluted it; also, why said authorities should not be required to dispose of the asylum sewage otherwise than by discharging it into the brook To the former question it may be replied, that if the sewage from a large population be turned into the small creek it will inevitably create a serious and dangerous nuisance, the abatement of which will involve the expenditure of much larger sums of money than would be required in the execution of a proper plan for the sanitary drainage of the territory under consideration; and to the latter question the answer is, that no good reason can be offered why the sewage from the asylum should not first be purified before turning it into the brook. In both cases, the element of great expense is involved, and the question accordingly arises how the sewage from both the urban districts and the State asylum can most expediently be removed. By referring to the accompanying map of the city it will be seen that the drainage area of Harbor brook within the corporate limits is about two square miles, of which the western and southern portions are hilly, while the eastern and northern portions are comparatively flat. In the spring, moreover, the brook usually becomes greatly swollen, so to overflow its banks and flood large areas of adjoining low lands. The conversion of the brook into a covered sewer would, accordingly, be impracticable, both by reason of the enormous expense entailed by such a project, as well as by the unsanitary condition of such a large channel in times of drought; and, on the other hand, if the creek were not covered while receiving the sewage from a large population, the emanations therefrom would, under the same circumstances, prove to be exceedingly offensive, if not absolutely dangerous, to the contiguous residents. It, therefore, only remains to provide an outlet sewer for the district into which the sewage from both the dwellings and the asylum buildings can be discharged with safety.

In planning such an outlet sewer, it will be expedient to exclude from the tributary sewers as much of the surface or storm-drainage water as possible, so as to avoid the cost of large under-ground channels. The hilly localities may accordingly be provided with a system of small pipe sewers for the removal of sewage only, while in the flat areas, larger sewers for the admission of both sewage and storm-water may be constructed wherever necessary. The latter question should, however, be very carefully considered before a final decision is reached, inasmuch as the discharge of large quantities of raw sewage into a small and shallow lake may ultimately give rise to an exceedingly offensive condition of the margins, which can be remedied only by a purification of the sewage before so discharging it; and as the cost of such treatment is directly proportional to the quantity of liquid conveyed by the sewers, it follows that the rain-water which falls upon roofs, streets and gardens should, under such circumstances, be excluded as far as practicable, from the public sewers. In the hilly districts, the conveyance of the surface drainage waters into Harbor brook becomes a comparatively simple matter, and will require no further mention here; but to what extent it may be expedient to provide separate underground channels for the removal of storm-water in the flat districts, cannot now be definitely determined, as the data indispensable for such a judgment are not available.

It is learned from Mr. Gere, city engineer, that no public sewers west of Geddes street and south of Gifford street, have yet been built; also, that in the territory east and north of said streets, the sewers have been constructed so as to discharge easterly into Onondaga creek. The problem of the best manner of draining and sewering the entire western area of the city, which is tributary to Harbor brook, is therefore free from all complication with existing costly constructions, and should receive careful study before any of the sewers now demanded in certain localities are built. As soon as an acceptable general plan of sewerage for the entire district has been prepared and adopted, the individual or tributary sewers may be commenced and completed with reference to such plan, wherever practicable; and from that plan, it may also be seen to what extent the construction of temporary outlets, or local sewers, may be justifiable in emergencies. Special legislation may likewise be needed for the purpose of acquiring easements, or completing portions of the system not petitioned for, etc., and all such necessities will best become apparent after a systematic plan of sewerage is submitted and thoroughly discussed. For the preparation of such a plan, however, it is necessary to have a complete topographical survey and map of the entire district; and as the former surveys were not extended westerly beyond Geddes street, it is now suggested that measures be taken to complete these surveys by extending them over the remainder of the area now embraced by the city limits. After this preliminary work is finished, the rational solution of the problem of draining the district may soon be reached, and criticism from experienced sanitary engineers obtained without vexatious delays.

From the examinations made on the twenty-second ult., no physical difficulties worthy of mention are likely to be encountered in the construction of a main outlet sewer through the low grounds on the east side of Harbor brook, from the foot of the southern hills northerly to some point in the flat area west of Geddes street and south of the high embankment of the New York, West Shore and Buffalo railroad, and thence either northwesterly into the lake, or northeasterly, a shorter distance, into Onondaga creek; but no opinion as to the proper size or cost of such a sewer can now be expressed for the reasons already mentioned.

With reference to the sewage from the asylum, it was stated in the foregoing that the same could readily be purified before being admitted into Harbor brook, if necessary. As there is an abundance of land available in the asylum grounds at a sufficiently low level to admit of subsurface irrigation, this method of treatment will, in my opinion, be the most expedient to follow. The details of this process are doubtless sufficiently well known to require no further description here, and its successful application at a number of large hotels and public institutions during the past decade warrants the recommendation. Like all other methods of sewage treatment, however, it involves considerable intelligent supervision and more or less annual expense; but on the whole, with careful management, it will doubless be found preferable to chemical treatment, or any system of mechanical filtration. The question as to whether the raw sewage in the brook creates a

dangerous nuisance at any time, is not here passed upon, since the members of the city board of health are much more familiar with the premises than the undersigned; and it is therefore sufficient for him to point out how the nuisance, if existing, may be abated.

In conclusion, permit me also to express my indebtedness for much information and kind attention to Dr. Alfred Mercer, Dr. James C. Carson and W. H. H. Gere, city engineer.

Respectfully submitted.

EMIL KUICHLING,
Civil Engineer.

SANITARY.

SANITARY.

REPORT

ON THE

Proposed Use of an Abandoned Cemetery for the Erection of a School-House in the Village of Port Jervis, N. Y.

By EMIL KUICHLING, Civil Engineer.

ROCHESTER, N. Y., *May* 12, 1887.

DR. LEWIS BALCH, Esq., *Secretary of the State Board of Health:*

DEAR SIR.—In relation to the proposed use of an abandoned cemetery for the erection of a school-house in the village of Port Jervis, N. Y., the undersigned, to whom the subject was lately referred for investigation, begs leave to state that on the sixth inst., he made a careful examination of the premises, as well as extensive inquiries of many prominent citizens and physicians of that village with regard to all of the circumstances involved and would now submit herewith the following:

In the spring of 1884, the board of education of Port Jervis acquired the title to a certain lot or parcel of land called the "St. John's Cemetery," for the purpose of building thereon a new school-house for the accommodation of the primary department. The land in question is immediately adjacent to the old school-house lot, on the northeast corner of Main and Sullivan streets, and was formerly an annex of the contiguous "Old Church Yard" burial ground, which was practically abandoned as a place of interment about thirty years ago on account of having become almost fully occupied with graves. St. John's cemetery was then brought into use, but as this lot is only about 186 feet long by ninety-seven feet wide on the average, and contains only about four-tenths of an acre, it was not long before the new area was found to be too small to meet the necessities of the rapidly growing village, and it was accordingly also became sick or complained of any indisposition whatever. The great majority of the bodies had been buried upwards of 18 years, and little was left of the coffins and surrounding pine boxes. The depth of the graves ranged from 4½ to 6 feet, except in a single instance where a body was found at a depth of 10 feet, in a place where there had originally been a depression in the surface, but which had subsequently been filled in. The soil, throughout the entire lot, is a sandy loam on top, and sand mixed with more or less gravel below. After the work of exhumation was finished, the excavated soil was replaced in the pits as far as practicable; and in order to destroy any vestige of human remains which may have become incorporated in the sandy soil left on the surface, the local board of health caused about a ton of copperas to be scattered over the whole area. This was left to be washed into the porous subsoil by the following spring rains. Since March, 1885, the lot has remained substantially in its present condition, all kinds of vegetation being allowed to grow thereupon at random."

The lot under consideration is located on an elevated plateau, which slopes gently to the south, and is bounded on the east, west and south by natural drainage valleys of considerable depth; while to the north, high rocky hills rise abruptly from the plain. The surface drainage waters appear to flow southerly and easterly from the locality, and at a point about 600 feet distant in a southerly direction, the surface begins to slope rapidly down to a lower plain. Referring to the accompanying diagram, which exhibits the location of the land in question, it may be said that from the intersection of Mary and Sullivan streets, the land slopes gently to the east and south; and at the intersection of Main and Kingston streets, it falls rapidly to the south and west. This latter intersection is about 750 feet distant in a direct line from the abandoned St. John's cemetery. The soil on this plateau presents a thin superficial layer of sandy loam, not exceeding two feet in thickness, underlaid by a bed of apparently clean sand and gravel, which shows itself very plainly on the bank of the depression to the south, also in numerous sand and gravel pits in the vicinity, as well as in partially unfilled excavations in the cemetery and adjoining lots. From excavations and borings made for wells, this mass of sand and gravel is known to be from 75 to 100 feet in depth in the immediate neighborhood of the old schoolhouse. The level of the ground-water is low, since on the day of my inspection, and after a severe and long continued rain, the surface of the water in two large wells, located within 500 feet of the exhumed cemetery, stood from 25 to 30 feet below the surface of the ground. In answer to inquiries, I was further informed that the fluctuations in this ground-water level were quite small. It should also be remarked that permanent wells can be obtained at only a limited number of places in this locality, a circumstance which is indicative of the existence of an irregularly shaped impervious substratum.

The surface of the abandoned cemetery gives ample evidence of having been thoroughly excavated, as it is marked by a multitude of depressions caused by the settlement of the loose material. Where the soil had not been disturbed, it was covered with an abundance of plants and bushes. No odor was noticeable at any of the deeper depressions, or elsewhere, on the lot; and, so far as can be determined, the work of exhumation appears to have been well done. To ascertain whether the soil gave any evidence of pollution during the past two years, I called upon Drs. Van Etten, Hardenburgh, Swartwout and Hunt, all prominent physicians of the village, and was assured that no cases of sickness, among either children or adults, which could fairly be attributed to contact with or exhalations from the soil of said cemetery, had occurred in their several practices during or since the exhumation; also that no such cases had been noticed by them among the young children who attended the school prior to the removal of the bodies. Now since the condition of the former cemetery has undoubtedly been more prejudicial to the health of the school children and the neighborhood generally during the past two years than formerly, by reason of the opening of the graves and the exposure on the surface of more or less subsoil which may have been polluted by the decomposition of the numerous corpses; and since no report of any noticeable odor or emanation from the present disturbed surface of said lot appears to have been made to any one in the village; and lastly, because none of the physicians who were closely questioned on this subject, could fairly attribute any case of sickness which had occurred in their practice to any such cause, it is reasonable to infer that the soil of the lot under consideration was not seriously polluted at the time of the exhumation; also, that in consequence of the action of the large quantity of copperas applied to its surface, and of the natural disinfection resulting from exposure to the atmosphere and the processes of active vegetation, its condition during the past two years has become materially improved, if improvement were possible.

According to the best authorities, and as explicitly stated in Dr. Carroll's report, a soil such as exists in this locality is that which is best adapted to the rapid decomposition of human remains. This fact is amply verified by the immunity of the neighborhood from noxious emanations and the diseases thereby induced; and as additional confirmation, we may refer to the elaborate experimental researches of Profs. Hofmann and Siegel relating to the quality of the subsoil, air and water in cemeteries and reported at the ninth annual convention of the German Hygienic Society. By these experiments it was proven that, with a favorable soil and careful management, cemeteries are by no means as dangerous to the health of the people living in the immediate vicinity thereof as had formerly been assumed, also that the subsoil air and water in such places of interment were in fact considerably purer than that which was examined in populous adjoining districts. Under all of these circumstances, therefore, the conclusion seems justifiable that the subsoil of the abandoned St. John's cemetery in Port Jervis is now not dangerously polluted with the offensive product of the decomposition of human bodies, and that by the strict observance of the precautionary measures indicated below, the site can be made reasonably safe for the erection of a new school-house, as proposed.

It should be remarked that water for drinking purposes on the premises is supplied from the public water works, and that no complaint as to the quality of this water or the purity of its source has yet been made. There are, however, no public sewers in this portion of the village, and all organic wastes from the surrounding dwellings and buildings are disposed of in cess-pools, etc., excavated in the extremely porus subsoil. A very deep and large device of this kind has been in use in the rear of the present old school-house for many years past, and is doubtless as great a source of danger to the health of the school children as the former cemetery, in consequence of the free passage of the gases of decomposition through the interstices of the sand and gravel. It accordingly seems that the only danger to be apprehended from the erection of a modern school-house upon the site in question lies in the possible introduction of foul ground air into the rooms where it may be inhaled by the children.

It is a well established fact that the air with which all porus soils are permeated above the surface of the ground-water vibrates, with every change of barometric pressure, and also with every change in the level of the ground-water; further, that through the cellars or basements, all heated buildings become, particularly in winter, the means of escape for the air contained in the surrounding soil. To determine to what extent different kinds of soil are able to disinfect or filter out injurious elements from the ground-air passing through them, many experiments have been made, among which perhaps the most recent and elaborate are those conducted in 1880 by Professors

Pumpelly and Smyth, and published in the report of the National Board of Health for 1881. The conclusions there reached are "that sand interposes absolutely no barrier between wells and the bacterial infection from cess-pools, cemeteries, etc., lying even at great distances in the lower wet stratum of sand; and it appears probable that a dry gravel, or possibly a dry very coarse sand, interposes no barrier to the free entrance into houses built upon such material of the organisms which swarm in the ground-air around leaching cess-pools, leaky drains, etc., or in the filthy made-ground of cities. * * * Also, that a house may be built on a thoroughly dry body of sand or gravel, and its cellar may be far above the level of the ground-water at all times, and it may yet be in danger of having the air of its rooms contaminated by the germs from leaching cess-pools and vaults; for, if the drift of the leaching be toward the cellar, very wet seasons may extend the polluted moisture to the cellar walls, whence, after evaporation, the germ will pass into the atmospheric circulation of the house." Statements of the foregoing nature should, however, be duly considered in connection with the remainder of the report, wherein it is expressly stated that sand whose grains are one-twentieth of an inch, or less, in diameter, "is an excellent filter in eliminating germs from infected air passed through it," and that all such air filters "withstood the test of currents having many thousand times the maximum velocity attained in the soil." Now sand having grains of the dimension named would be classed as coarse; and hence to insure an efficient filtration of the ground-air of the abandoned cemetery lot, it will only be necessary to surround the foundation walls and cover the surface of the cellar of a proposed building on this site with some finer grained material, such as sandy loam, which can be obtained in abundance.

There are, however, a number of other elements which enter into the problem and deserve proper consideration. The gases of decomposition of organic substances can not be changed by simple mechanical filtration through sand of any degree of fineness, and it is only the bacteria or germs which may be contained in the ground-air that are arrested by such filtration. The depressing effect of these gases, if the exposure thereto be long continued, is well recognized by all physicians, and it is accordingly desirable to either prevent their entrance into inhabited apartments, or else to provide an easier method for their escape than through the foundation walls and basement floor. Of these two plans, the latter is vastly more practicable than the former, and the recommendations submitted below have the accomplishment of this object in view. Before proceeding with these details, however, it may perhaps be of interest to refer briefly to the subject of the self-purification of a polluted soil, and the action of certain kinds of minute organisms which abide therein.

It may be regarded as an axiom, that as soon as the pollution of a soil ceases, the soil will, in the course of time, purify itself; also, that a clean soil to which no greater amount of impurities is added than it can manage to dispose of will remain practically clean. From the recent carefully conducted researches of Schlösing, Müntz, Wollny, Fleck and others, it has been found that in the resolution of complex organic matter when buried in earth or natural soil a two-fold action or process takes place, the one being a relatively slow and purely chemical process, while the other is a relatively quick biological process, caused by the development of certain microbes whose exact nature is not yet definitely known. The rate at which decomposition occurs depends upon a number of factors; such as the composition of the soil, its permeability, the degree of moisture, temperature, etc.; but of all these the most important in hastening decomposition is the free passage of air through the pores or interstices of the soil. Wollny also asserts that the intensity of the biological process is greatly accelerated when the surface of the ground is bare and free from ordinary vegetation. The depth below the surface at which these microbes are found also varies with the above named factors, it being generally considered that they occur in greatest number in the uppermost strata, although they are still abundant in well drained soils ten feet below the surface. They also inhabit all kinds of soil, their number depending upon the amount of organic substances contained therein, in addition to the other conditions above mentioned, and their function appears to be the conversion of unstable nitrogenous compounds into permanent nitrates, and, to some extent, also, the transformation of carbon compounds into carbonic acid and minute quantities of alcohol. It is, therefore, obvious that if the conditions favorable to the growth and development of these minute organisms be introduced in a soil which is suspected of being contaminated by organic matter, as in the case of the exhumed and abandoned St. John's cemetery, a substantial improvement will be sure to follow in case that any putrescible human remains have been left in the ground.

The site under consideration is not regarded by me as an ideal one for the erection of a school-house for the use of young children; but it is doubtful if much superior sanitary conditions can be insured on any other available site in the vicinity of the present old building, in view of the relations above mentioned. From all of the evidence submitted, it is fair to presume that little if any, danger is to be apprehended from either the long disused old burial ground on the adjacent church property, or the recently exhumed and disinfected St. John's cemetery; but since there is a possible danger from these two sources, it will, in my opinion, be advisable to adopt the following precautions in the event that the citizens of Port Jervis adhere to their intention of utilizing the said site for the proposed new schoolhouse.

First. A main line of four-inch drain tile, laid with open joints and on a true grade, should be constructed close to the division fence between the church property and the school properties; said line to extend through the entire length of both lots to Main street, and thence to be continued through Main street to Kingston street, where it will terminate in an open gutter. For the latter portion of this distance, the tile may be laid with tight joints to exclude any surface water. In the exhumed cemetery lot, a series of similarly laid drain tile, 2 inches in diameter, and placed at right angles to the main line and about 40 feet apart, should then be constructed. The depth of the trenches to be such that the top of the tile in the main line shall be about 2 feet below the level of the cellar floor of the contemplated building, and in no case to be less than 6 feet. The grades may be relatively slight, such as 1 in 300, but they must be truly and rigidly maintained. Underneath the proposed building, similar transverse lines of 2 inch drain tile should be laid about 20 feet apart, and the heads of these lines should be connected with a longitudinal line of 3 inch tile, as shown in the adjacent diagram, in which a, b, c, d represents the St. John's cemetery lot, and the dotted lines the series of drains above suggested. To complete this work, an air inlet in the form of a piece of iron pipe, 4 inches in diameter, and projecting about 10 feet above the surface of the ground, may be inserted in the main drain at some convenient point B, while near the highest point of the system of pipes, as at A, a similar 4 inch iron discharge pipe should be extended above the roof of the proposed building. Owing to the porous character of the soil and the low level of the ground water, these lines of drain tile are not expected to carry off any water, but serve simply to admit fresh air into the suspected subsoil, and to intercept any foul ground-air, especially during the winter.

Second. The foundation walls of the proposed building should be laid up as tightly as possible with hydraulic cement mortar; the existing soil in the basement or cellar should all be removed down to the tops of the transverse lines of drains; fresh and clean fine sand and sandy loam should thereupon be drawn into the cellar to replace the material which was previously removed, and then be well compacted so as to bring the surface of the cellar about 1½ to 2 feet above the said drain pipes; and on the completion of this work, the entire cellar bottom should be covered with a layer of cement mortar from 1½ to 2 inches in thickness. This mortar should be properly mixed in the proportions of one part by measure of the best quality of American cement to not more than three like parts of clean sand. The trenches for the foundation walls should furthermore be cut in such manner as to leave space on the outside thereof for a filling of at least eight inches in thickness of clean sandy loam all around the building next to said walls. The object of these operations is to prevent, as far as possible, the entrance of foul ground-air into the cellar, either through the walls or through the floor, and to compel said air to find its way into the system of drain pipes, and thence to escape through one or both of the iron pipes at A and B.

Third. The remainder of the abandoned cemetery lot, not occupied with the proposed building, should be thoroughly ploughed over and graded, after which the surface should be covered over with a layer of clean sandy loam several inches in thickness. To allow the action of this soil to take place quickly, it should be left unplanted for a few seasons.

Fourth. Particular attention should also be given to the method of supplying fresh air to the heating apparatus of the proposed building, and to the exclusion of all air for this purpose which may find its way into the cellar.

If the foregoing measures are faithfully carried into effect, I feel confident that the site under consideration will become reasonably safe from a sanitary point of view. The expense involved in such treatment of the locality will be about $750

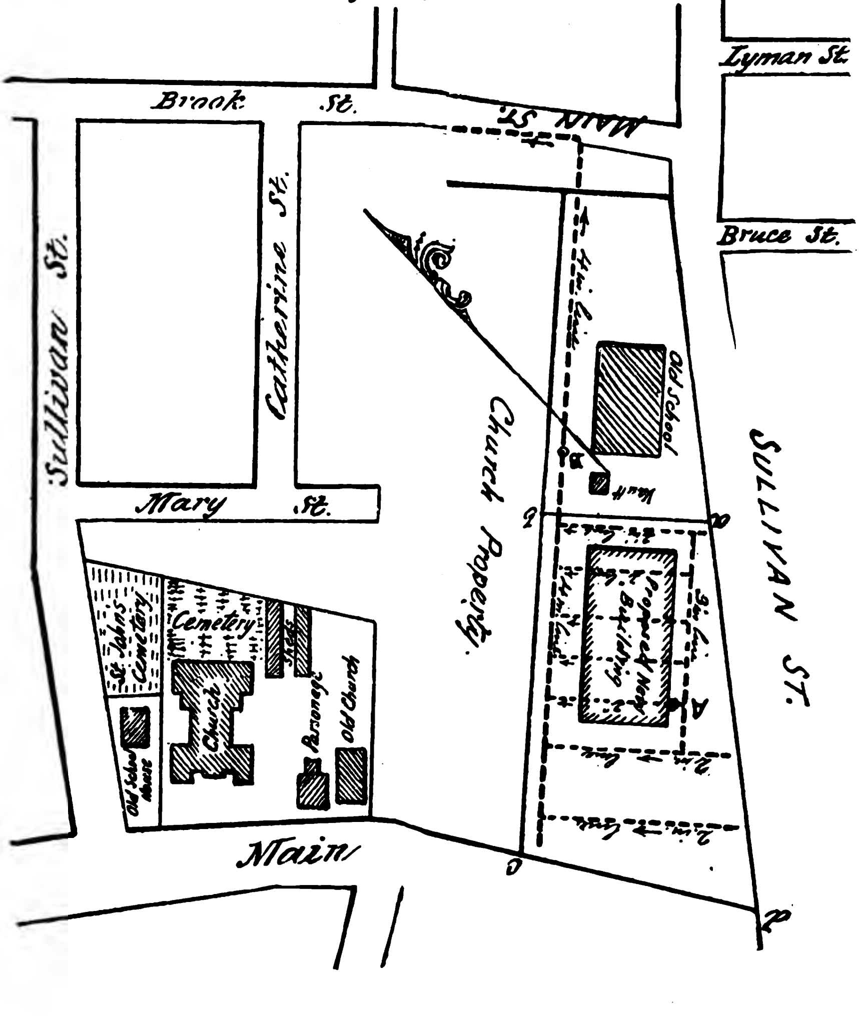
Respectfully submitted.

EMIL KUICHLING,
Civil Engineer.

Diagram showing St. John's Cemetery.

From Map of Port Jervis, made in 1883.

Scale = 250 feet per Inch.



REPORT

UPON THE

Effect on the Subsoil Water of Further Interment in Old Cemetery, at Afton, Chenango County, New York.

By Emil Kuichling, Civil and Sanitary Engineer.

Rochester, N. Y., *July* 12, 1887.

Dr. Lewis Balch, Esq., *Secretary of the State Board of Health*:

Dear Sir.—In relation to the matter of forbidding further interments in the old cemetery, known as "The Baptist Burying Ground," situated in a populous district in the village of Afton, Chenango county, N. Y., the undersigned begs leave to state that on the eleventh ult., in company with Dr. D. A. Bissell, health officer, and Mr. A. D. Casswell, of the local board of health, he made a thorough examination of the locality, and subsequently held a long conference with a large number of interested residents of the village. The facts elicited and the conclusions reached are herewith set forth in the following report:

The old cemetery complained of by a number of citizens is situated in the eastern part of the village of Afton, near the junction of Main and Caswell streets, and immediately in the rear of a number of dwellings and shops fronting on said streets, as shown upon the accompanying maps. Its area is nearly one-half of an acre, and its use as a place of burial began about 41 years ago. At the present time, about 200 bodies lie buried in it, most of the interments, however, having been made prior to 1877, in which year a new cemetery was established at a more remote point. Since then, about 35 burials have been made in the old cemetery, 4 of which occurred within the past 12 months.

These four bodies were placed in the southern portion of the grounds, the latest one being near the point marked D, which is less than 100 feet distant from two wells used for supplying drinking water to the occupants of the premises owned by Silas Fairchild and Charles Seeley, and somewhat further from several other wells in the vicinity, as will be seen by referring to the map. The fear that the subsoil water flowing into these wells was becoming polluted in consequence of these burials, and the avowed disinclination of a number of lot-owners in the old graveyard to abandon the site for future interments, notwithstanding the establishment of the fine new cemetery, have led to the petition to the health authorities to prevent further use of the old grounds.

As is usual in such cases, differences of opinion with respect to the necessity of abandoning the old cemetery, on the score of public health, have arisen. Many families, in the village have buried their dead in the old grounds, and the survivors naturally desire to find a last resting-place beside their departed relatives or ancestors. Others, again, object to an exhumation of their deceased and the transfer of the remains to the new cemetery, for various reasons; and are sustained in their objection by a few owners of adjacent premises, who express the belief that no pollution of their wells either exists now, or is to be apprehended hereafter, even though the use of the old graveyard be continued until it has become completely filled. Under these circumstances, the local health authorities have decided to submit the matter to your board and be governed by your judgment in the premises.

An inspection of the locality shows that the old cemetery is situated upon a slight prominence in a small alluvial plain which slopes in a south-easterly direction towards the Susquehanna river, and is bounded on the west by a range of high hills, along whose base Main street and Caswell street have been laid out. The surface of the cemetery slopes moderately in all directions from the slight summit, but the descent is greatest towards the south and east. To obtain positive evidence regarding the character of the soil, I caused three test pits to be excavated to a depth of about 6 feet in the southern part of the grounds, at the points marked A, B and C, on the map. From these pits, it was found that at the surface the soil was a fine, sandy loam, varying in thickness from about 6 inches at the summit to about 2 feet at the lowest places; and below this, came a stratum of nearly clear sand, extending down to a depth of from 5 to 7 feet, where a thick deposit of coarse sand and gravel mixed with small boulders was encountered. According to the statements of those who have dug wells in this locality, the soil in the lots adjoining the cemetery exhibits the same general structure and character as above described; and it is further stated by the same parties that underneath the aforesaid deposit of gravel a bed of quicksand of unknown depth occurs. From this latter source the supply of the wells in the plain is derived. The graves in the old cemetery are usually made about 5 or 5½ feet deep, at which depth the surface of the subsoil water has never been reached. This dry, sandy soil is extremely favorable for the rapid decomposition of the bodies buried therein; and when, soon after the establishment of the new cemetery, a number of disinterments and removals from the old grounds were made, it was found that a burial of from 8 to 10 years sufficed for the reduction of a body to merely a dry skeleton, if inclosed in an ordinary wooden coffin.

From the configuration of the land in this locality, as well as from its geological structure, it is reasonable to presume that the general course of the subsoil water is towards the southeast, or in the same direction as the general surface slope of the plain already described. This presumption is fully sustained by the observations and measurements made on the day of my visit at the several wells shown upon the map, and herewith submitted in the following table:

Number of well.	NAME OF OWNER.	Character of well.	Distance from nearest grave.	Distance from surface to bottom of well.	Distance from surface to the water in well.	Estimated elevation of surface of ground at well relatively to that in Jacobs' well.	Estimated elevation of water surface in well relatively to that in Jacobs' well.
			Feet.	Feet.	Feet.	Lower.	Lower.
1	Daniel Jacobs......	Open and stoned..........	73	20	12	....	....
2	Mrs. Woolley	Open and stoned..........	....	....	12	4 feet..	4 feet.
3	Wm. Partridge	Closed and tubular, originally stone.	....	*	....	5 feet..	....
4	Silas Fairchild......	Open and stoned..........	86	17	13½	4 feet..	5½ feet.
5	Chas. Seeley........	Open and stoned..........	96	16	12½	9 feet..	9½ feet.
6	B. Whittaker........	Open and stoned..........	....	14	9¾	13 feet..	10¾ feet.
7	L. Nye..............	Closed, in cellar..........	....	....	....	14 feet..	....

It should be remarked that the differences in elevation, or level, of the surface of the ground at the several wells, as above recorded, are merely approximate estimates, since proper instruments for correctly determining these differences were not at hand; the figures are, however, sufficiently accurate for the purpose, inasmuch as they show conclusively that the general surface of the subsoil water slopes from the cemetery towards the river, as already stated. Most of the wells mentioned have been excavated through the upper sand and

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* Originally seventeen feet; tube now deeper.

gravel strata nearly, if not quite, to the underlying quicksand; and I am informed that the water surfaces therein exhibit considerable fluctuations at different seasons of the year; also that in times of severe drought a number of them become entirely dry. It is furthermore alleged that all of the wells in this particular district of the village, excepting those belonging to Mr. Fairchild and Mrs. Woolley, have been constructed and used since the time when the old cemetery was first established.

Now, from the proximity of the graves, the extremely porous character of the soil, and the general direction of flow of the ground-water, the inference is justifiable that the water in the wells adjacent to the cemetery is polluted by the products of the decomposition of human bodies; but as a number of intelligent residents have expressed their conviction that the cemetery is harmless, and that more danger to the well water is to be apprehended from privies and barnyards near by, a brief description of the other surroundings of these wells will now be given, reference being had to the accompanying map. At the time of my inspection the yards of all of the premises indicated were in a very decent condition, and the barns and poultry sheds were also fairly clean. The privies, however, were simply pits, excavated to a greater or less depth in the sandy soil, from which the contents leached away into the ground. On two premise only removable wooden boxes placed on the surface had been provided instead of the ordinary privy; but the essential feature of this system of disposal of organic wastes was to a large extent destroyed by numerous perforations in the sides of the boxes, from which the liquid matter was oozing out. The distances of these out-houses from the wells are all given on the map, and range from twenty-six to ninety-five feet. None of the families occupying the premises are unusually large, and the wells are so curbed as to exclude surface drainage.

The water from these wells, when freshly drawn, appears to be clear, colorless and free from any peculiar taste or smell; but in order to learn whether it was polluted by organic matter, or by leachings from the privies and barnyards the undersigned subjected four samples of water, taken from the wells of Messrs. Partridge, Fairchild, Seeley and Whittaker, to a microscopical examination, and thereafter to Heisch's test with cane sugar, as also to a test for chlorine with a solution of nitrate of silver. The samples were kindly collected and forwarded to me in sterilized bottles by Dr. D. A. Bissell, who likewise made similar examinations independently. When received all of the samples were clear and devoid of any smell or taste, although each contained a slight deposit. After being allowed to stand for twelve hours in a cool and dark place samples of the sediment were withdrawn by means of dipping a tube and then examined under the microscope, with the following results :

No.	Water from	Remarks. (Microscopical examination.)
1	Fairchild's well.....	Slight sediment, consisting of very fine sandy and mineral matter, mixed with a small amount of decayed vegetable matter and fiber; a few diatoms and minute filamentous algæ. No living animalcules or infusoria found, either in sediment or at surface. Might consider the water good.
2	Partridge's well	Some sediment, consisting of fine sand and mineral matter, and a number of relatively large black masses of organic matter, probably of vegetable origin ; also, vegetable fibers, rootlets, etc., a few diatoms and colorless filamentous algæ, and several objects resembling ova of water insects. No living animalcules or infusoria found, either in sediment or at surface. Might consider the water good.
3	Whittaker's well....	Some sediment, consisting of fine sand and mineral matter, mixed with decayed vegetable substances and fiber; some diatoms and desmids : a few minute, green, branched algæ and others of a colorless, filamentary appearance ; numerous common bacteria and cocci; also some objects resembling ova of water insects. No living infusoria found, either in sediment or at surface. Might call the water suspicious.
4	Seeley's well	Some sediment, consisting of fine sandy and mineral matter, with a number of relatively large black masses of organic and mineral matter aggregated about fragments of woolen and vegetable fiber; a number of colorless, filamentous, algæ or fungi ; numerous common bacteria and cocci ; also, some ova of insects or entromostraca. All of the black masses examined swarmed with living infusoria (paramecia). Might call the water bad.

Heisch's simple test for organic matter by the addition of a few grains of pure cane sugar to the water, and then allowing it to stand quietly in the light and in a warm place, afforded the following observations:

Number.	WATER FROM	APPEARANCE OF THE WATER AFTER STANDING				
		Twelve hours.	Twenty-four hours.	Thirty-six hours.	Forty-eight hours.	Sixty hours.
1.....	Fairchild's well.......	Clear...................	Faintly turbid (1)......	Faintly turbid (1)......	Distinctly turbid (2)...	Distinctly turbid (2).
2.....	Partridge's well.......	Clear...................	Faintly turbid (1)......	Faintly turbid (1)......	Distinctly turbid (2)...	Distinctly turbid (2).
3.....	Seeley's well...........	Faintly turbid (1)......	Distinctly turbid (2)...	Distinctly turbid (2)...	More turbid (3)........	More turbid (3).
4.....	Whittaker's well......	Distinctly turbid (2)...	More turbid (3)........	Very turbid (4).........	Very turbid (4).........	Milky (5).

The degree of turbidity developed in the water is indicated by the figures following each designation in the above table. Under the microscope the cloudiness was found to be caused by swarms of bacteria, etc., and in the case of No. 4 many infusoria were also found.

Before introducing the sugar for the preceding test about three ounces of clear water from the surface of each sample was drawn off and concentrated by boiling into about one-fourth of its volume, whereupon it was tested for chlorine by means of a solution of nitrate of silver. In each case a distinct white precipitate was formed, although small in amount, which was presumably chloride of silver. It is, therefore fair to infer that chlorine in some form exists in the well waters, and as this element is usually regarded as the index of sewage pollution the inference follows that the water is contaminated by leachings from the privies and barnyards.

From the foregoing, I feel warranted in holding the opinion that the waters of all of the wells contiguous to the old cemetery are more or less polluted; and further, that no water from the Whittaker and Seeley wells should be used for drinking unless previously boiled and filtered. It may, however, be urged that inasmuch as the examinations above described were not made by an expert chemist, the opinion just expressed should not be acted upon hastily and to the damage of the owners of the said wells, who would thereby be compelled to obtain a water supply for their premises from some other source; and I therefore recommend that, if such objection is made, a thorough physical, chemical and biological examination of these well waters be conducted at once by some analyst of sufficient repute to inspire the fullest confidence. It may also be remarked that the Seeley and Whittaker wells lie in the probable course of the subsoil water which flows under the old graveyard, and that this circumstance may account for the relatively larger amount of organic matter contained in their waters, as revealed by both Heisch's test and the microscope.

Whether the pollution comes from the privies and barnyards, or from the cemetery, can not be definitely determined by the comparatively simple investigations made by the undersigned; but I incline to the belief that the cemetery is a far more serious source of contamination than the others. The fact that, under circumstances such as are found to exist at the locality in question, the subsoil water can be dangerously polluted by a graveyard, is a matter of common knowledge among hygienists; and too many well established instances of sickness resulting from the use of water thus infected have been recorded to leave room for much doubt. Without citing a long list of particular cases, it will perhaps be sufficient to say generally that the degree to which the purity of neighboring wells is endangered by a cemetery and the distance to which contamination may extend obviously depend upon the relative elevations of the respective sites, and upon the nature of the intervening strata. A dangerous state of things is when the graves and wells are both sunk in porous soil resting upon a bed of impervious clay, or when, in wet seasons, the level of the ground-water rises so as to wash out the polluted soil around the graves and carry the products of decomposition into the wells. Dr. Parkes, in his large work on hygiene, states that "the water from graveyards contains ammonium and calicum nitrates and nitrites, and sometimes fatty acids, and much organic matter. Lefort found a well of water at St. Didier, more than 330 feet from a cemetery, to be highly contaminated with ammoniacal salts and an organic matter which was left on evaporation. The water was clear at first, but had a vapid taste and speedily became putrid." In France the opening of wells within 330 feet of any place of burial is forbidden by law ; but this distance is now said to be insufficient for deep wells, which have been found on examination to be polluted at a distance of from 500 to 660 feet. In some parts of Germany, too, the use of wells nearer than 300 feet to a cemetery has been prohibited. The contamination of water in wells by gas works was in several cases observed at distances of 800 and 1,000 feet. With regard to the time required for the destruction of dangerous organic matter in the soil little that is definite can yet be said. In Buck's treatise on hygiene the following passage is found: "It is is impossible to say how long the *materies morbi* may continue to live under ground. If organic matter can be boiled and frozen without losing vitality, and seeds 3,000 years old will sprout when planted, it would be hardihood to assert that the poison of cholera, yellow fever or small-pox, whatever it is, may not for years lie dormant, but not dead, in the moisture and temperature of the grave." Besides the standard works of reference on this subject already cited, mention should also be made of the excellent and exhaustive papers on interments and burial contained in the reports of the State Boards of Health of Massachusetts and New Jersey for 1875 and 1883, respectively; also in volume 11 of the American Public Health Association reports, and in the eleventh annual report of the British Local Government Board. In all of these documents, as well as in numerous others not named, abundant testimony in support of the views above expressed will be found.

The circumstance that the water of these wells, when freshly drawn, is clear, bright, and inoffensive to the senses; and the further fact, that none of the local physicians can possitively attribute any case of sickness in that particular district of the village to the use of the wells, must not be construed as proof that the said water is pure, since experience has shown that water highly charged with dangerous organic matter, both in solution and suspension, may possess all such properties. Grossly polluted wells are occasionally found which have never been known to directly produce specific diseases; but, on the other hand, hundreds of cases are on record where sickness has been coincident with the use of well water more or less contaminated by animal matter or the products of its decomposition. The circumstantial evidence connected with this subject can, in the present state of our knowledge, by no means be disregarded in forming a judgment; and therefore, to use the language of the late eminent water analyst, Professor William Ripley Nicholas, "it must be said that the continued use of a well water proved to be polluted is as unjustifiable as suicide generally is. * * * Under what conditions the water may become injurious, and when, no one can say." To account for the deleterious action of organic matter in drinking water, we are forced to believe, either that such substances undergo a constant change and, in certain stages of decomposition, can produce illness, or that they are the chosen vehicles of particular morbific agents, or lastly, that they have the effect of predisposing some persons to disease which fails to attack others not subjected to the same conditions; but whatever may be the true explanation, it is certain that the presence of such matter in relatively large quantity in well water should always be regarded with great suspicion.

In view of all the circumstances attending this case, as above set forth, it is obvious that either the old cemetery should be permanently abandoned, or that the adjacent wells be closed, if upon further examination of the waters an objectionable amount of contamination by organic matter is found therein. The decision must be left to the parties immediately interested, and it should, moreover, be quickly reached and enforced. In general, it may be said that it is much easier, cheaper and more expedient to abandon the use of an old burying-ground, undesirably located in a populous district, than to maintain it for the use of only a small number of families, and thereby obstruct the natural growth and development of one portion of a prosperous village; also, that while it is eminently proper to respect the dead, it is nevertheless an imperative duty to protect the health of the living; and it has been truly said "that the dead and the living were never intended to be brought into close proximity." On general principles of hygiene, therefore, even if no direct pollution of the wells has yet occurred, the use of the old cemetery should henceforth be discontinued.

With regard to the water supply of the contiguous premises it should be remarked that in case the wells thereupon are closed an adequate supply of good spring water can readily be secured at comparatively small expense, by an extension of the pipes of the water company, which supplies a number of buildings and residences in the village. The abandonment of the wells, therefore, will not cause irreparable damage to the owners of the property under consideration.

There is, accordingly, no good reason why the people who reside upon the premises adjoining the old cemetery should continue to be exposed to any danger, either actually existing or hereafter possible, from the pollution of the subsoil water. The abatement of such danger is practically a matter of relatively small cost, whether the cemetery be abandoned or the wells be closed. From a strict sanitary standpoint both of these plans should be followed at once, and the use of the wells should not be resumed until ample proof has been secured that the waters yielded by them, at all times, have reached the standard of purity which experience has shown to be essential for the proper conservation of the public health.

Respectfully submitted.

EMIL KUICHLING.

Civil and Sanitary Engineer.

REPORT

ON THE

Unsanitary Condition Existing at Canastota, N. Y.

By EMIL KUICHLING, Civil and Sanitary Engineer.

ROCHESTER, N. Y., *May* 28, 1887.

DR. LEWIS BALCH, Esq., *Secretary of State Board of Health, Albany, N. Y.:*

DEAR SIR.— In relation to the alleged nuisances in the village of Canastota, Madison county, N. Y., of which complaint was made early this spring to your Board, and which I was directed by you on the twelfth inst. to investigate, the undersigned begs leave to state that a thorough examination of the localities complained of was made on the fourteenth inst. in company with Dr. J. W. Knapp, health officer, and Messrs. W. E. Storrs and W. R. Grout, members of the village board of health; also to explain that in consequence of the time required to procure certain necessary data the following report has been unavoidably delayed:

The nuisances complained of at Canastota are three in number, and refer to malaria and its associated ailments, which are alleged to emanate from the following proximate sources:

First.—A large and shallow mill-pond in the southern portion of the village;

Second.—Two sections of the old and abandoned Erie canal, in the western portion, which are now inadequately drained; and

Third.—A drainage ditch of insufficient capacity and outfall located in the eastern portion and said to have been constructed by the canal authorities of the State. Of these, only the first and second cases seem to me to require prompt attention, since in the third case, trouble is experienced only in times of freshet or heavy rainfall, and certain legal questions are involved which require settlement before any valid engineering advice can be given. The relative location of these several sources of complaint is exhibited upon the accompanying map, which was prepared for Dr. Knapp by Mr. C. F. Barlow, the official village engineer.

THE MILL-POND.

The most serious and extensive of the nuisances mentioned is the large mill-pond formed by a dam, about twenty feet high, across the channel of Canastota creek, and situated in the centre of a populous district of the village, a short distance south of the N. Y. C. and H. R. R. R., and the N. Y., West Shore and B. R. R. This pond is owned by Mrs. F. C. Jarvis, of Canastota, and when full, its water surface covers an area of about 3½ acres; and if the marshy and saturated margins of land surrounding the said water surface also be included, the total area will be increased to nearly 5 acres. The water privilege has been in existence for about 70 years, during which period large quantities of silt appear to have been deposited upon the original bottom of the pond, whereby it has become very shallow throughout nearly its whole extent; so that if, at the present time, the water level therein be reduced only 2 feet below the crest of the dam or overflow, the water surface behind the latter will be diminished to an aggregate area of not more than about ¾ acre. It is conceded that such a reduction in depth is necessary and customary while operating the mill during the warm season, since the creek does not then furnish continuously the requisite volume of water. The flow must, accordingly be impounded, and after a sufficient amount has accumulated in the pond, the operation of the mill can be resumed.

On the date of my inspection, the discharge of the creek was about 220 cubic feet per minute, an amount sufficient to give only about seven horse-powers with the fall of 18 feet available at the mill, while at least four times this quantity is said to be necessary for running the machinery. It is also admitted by Mr. Jarvis and others that the flow of the stream becomes considerably smaller during periods of drought. In view of these facts, therefore, it is fair to assert that if the water power is used for the operation of the mill during the warm season, only a few hours of such use will suffice to exhaust the impounded water, and hence, to expose an area of from 2¾ to 4¼ acres of pond bottom and margins to the atmosphere. The large area so exposed does not usually again become flooded until after the lapse of from sixteen to twenty hours in the summer; and as it is covered with a profusion of rushes and other aquatic plants, and also abounds in many varieties of animal life, some of which quickly die upon exposure to the air and the direct rays of the sun, it follows that, under such circumstances, a disagreeable effluvium is produced which spreads itself over a relatively large extent of territory.

But in addition to the organic matter which is developed upon the bottom and margins of the pond, a certain amount of sewage and garbage from adjacent dwellings also finds its way therein, both directly and indirectly. Evidences of such pollution were found in a few instances during our examination, not only in the form of house-drains terminating at the margin of the pond, but also in the form of piles of garbage and other rubbish deposited near its shores, ready to be washed into it by rains. I am also informed that the drainage and liquid wastes from a slaughter-house, located at some distance south of the pond and just outside of the limits of the village, flow into the creek, and thus add to the other impurities mentioned.

From the foregoing, it will be seen that the principal factors which sanitarians have associated with the occurrence of malarial disease, viz.: decaying organic matter, heat, moisture, and a fluctuating water-surface, are all present in the case of this mill-pond; and the fact that such disease has prevailed for a number of years past and still prevails among the families dwelling in the vicinity of this body of water, as attested by the health officer and other reputable physicians of the village, as well as by numerous inhabitants, may fairly be accepted as proof that any additional factor essential to the production of malaria has found lodgment in the pond or its margins. In the present state of sanitary science, the precise cause of malaria is still in dispute; but the overwhelming weight of evidence seems to be, that when shallow mill-ponds are thoroughly drained, or are properly maintained in the form of deep reservoirs with abrupt sides, the malaria which had previously existed in their vicinity will soon disappear. In the case under consideration, therefore, I am of the opinion that the present condition and use of the Jarvis mill-pond is such as to warrant the conclusion that it is a danger and menace to the public health. This judgment is necessarily dependent, in some degree, upon the statements made to me concerning the actual existence of malarial fevers in the locality, and their prevalence in the past. Several such statements have, at my request, been made in writing, and are hereunto appended.

It now remains to consider how the necessary relief from the offensive and deleterious emanations from the mill-pond, or rather from its alternately wet and dry bottom and margins, can be secured. Only two methods are practically available. The first and simplest is to destroy the water privilege by removing the dam, deepening the creek's channel wherever the same has become obstructed by silt, and then properly draining the wet or swampy bottom and margins of the pond area by a sufficient number of lateral ditches. This work can be accomplished quickly and at small expense, provided that the water privilege is given up; and the land thus reclaimed can thereupon be cultivated and made productive, as well as healthful. The second method contemplates the maintenance of the water privilege, but involves an expensive improvement of the pond and its conditions by the performance of the following described work: All of the material on the bottom and margins of the pond should be excavated to such depth that a stratum of water, not less than 3 feet in thickness, shall, at all times and under all circumstances of the ponds' use for suppling water power, remain standing thereupon; the sides or banks should be cut or formed with the steepest practicable slope, such as 1 foot vertical to 1½ or 2 feet horizontal measurement; and the material thus removed, which contains more or less organic matter, should be deposited in banks where it can be treated with a covering of quicklime, or else removed to some convenient field where it can be ploughed into dry soil. By these means the shallow and swampy mill-pond will be changed into an inoffensive reservoir, in which any required fluctuation of the water surface will expose only an inappreciable area of steep margin, and whose depth will still be sufficient, after having been drawn off to supply the mill, to prevent the growth of the more delicate varieties of algæ, whose decay frequently gives rise to disagreeable odors; the organic matter, also, now contained in the muddy sides and bottom, will thereby become rapidly decomposed and cease to be offensive.

The choice between these two plans of relief must be left to the parties immediately interested, since there are a number of peculiar local complications which must be thoroughly considered before arriving at a decision. Under ordinary circumstances the sacrifice of an unreliable water privilege would seem to be the simplest and most economical solution of the difficulty; but in the present case, it may be thought that the mill-pond should be retained, in which event the second method alone remains available. The present mill was built in 1861 or 1862, and was fitted for the manufacture of flour, etc., by water power. The creek, however, proved to be untrustworthy as a source of power after a number of years, and in 1876, the water wheels were supplanted by a steam engine and boiler. In 1883, a small saw mill was built near to the flouring mill, in order to utilize the water power afforded by the pond which was not needed for the operation of the latter establishment; but in October, 1886, this saw mill was destroyed by fire, and has since not been rebuilt. In 1885, the village constructed a system of water works, the supply for which was taken from Canastota creek about two miles above the pond, and whereby the owner of the mill property considered the water privilege impaired in value. This year, however, the said owner determined to make use of it again for running the flouring mill; and accordingly, in February, 1887, a thirty-horse power turbine wheel was put in place therein to take the place of the steam power which had formerly been introduced. The precise object of the owner in making this change can only be conjectured, since an improvement in the water power afforded by the creek is now not to be anticipated. However this may be, the owner of the mill property claims that the water is at the present time his source of power, and that its storage in the mill-pond is absolutely necessary in seasons when the discharge of the creek is not equal to the capacity of the turbine. For this reason the method of improving the sanitary condition of the pond by properly excavating the same, as above described, has been proposed for consideration.

It is also fair to state that the mill property has been in possession of the family of the present owner since 1873, and that during the whole of this period they have lived close to the pond without ever having experienced any symptoms of malaria; they also deny that any malaria exists among any of the other families living in the vicinity of the pond, and thus contradict the statements of the physicians and other residents. As to the pollution of the pond by the inflow of sewage, the deposit of garbage, etc., it may be remarked that both Mr. Jarvis and the health authorities were urged by me to cause all such practices to be promptly suppressed, and the ways and means of accomplishing such suppression were likewise pointed out. With regard to the expediency of a forcible abatement of the nuisance caused by the intermittent use of the mill-pond, in the event of non-compliance on the part of the owner with the orders of the health authorities, the corporation counsel was requested to express an opinion as to the legal powers vested in the village board of health.

THE PORTIONS OF ABANDONED CANAL.

By the enlargement of the Erie canal, two sharp curves of the former channel in the western portion of the village were cut off and abandoned by the State. One of these sections is on the north side, and the other on the south side of the present canal, and neither of them is adequately drained. The old channel is still well defined in a number of places, and contains more or less stagnant water, together with a dense growth of rushes and water-weeds of various kinds. An attempt to drain these pools appears to have been made by the construction of a series of ditches; but from the lack of sufficient grade and of subsequent attention on the part of the canal authorities, the ditches have gradually become obstructed, and the areas designed to be drained thereby have become swampy. Diphtheria has, within a few years, prevailed quite extensively among the families dwelling in the vicinity of these undrained pools, and the physicians attribute a large share of the trouble to the saturation of the soil resulting from the want of proper drainage. Much of the water which stands in the abandoned channel on the south side of the present canal undoubtedly is the surface drainage from the adjacent higher ground, but the remainder is leakage from the present water-way. On the north side of the canal, substantially the whole of the water which collects in the bed of the old channel is leakage, and several small frame dwellings have been erected on timber supports directly over the swampy soil. In some places attempts at ditching and draining have been made, but without success since the ditches become obstructed and no control over them appears to be exercised. On both sides of the present canal, at the localities under consideration, the conditions are such as to be prejudicial to the public health by reason of inadequate drainage, and efforts should be made to secure prompt relief by a thorough removal of all stagnant waters contained in the old canal bed.

From the inquiries made by the undersigned and the health authorities of Canastota, it seems that the title to all of the marshy areas in said old canal bed is still vested in the State. Should this prove to be the fact, it is clearly the duty of the canal department to at once place the lands complained of in a proper sanitary condition, either by clearing the obstructed existing drainage ditches and providing the same with suitable out-fall and grades, or by properly filling in the abandoned canal prism to such depth as will permit of adequate drainage into the out-falls already at hand. The drainage waters collected on the south side of the canal are at the present time discharged into ditches on the north side through a "diving" culvert, or inverted siphon, the breast walls of which will admit of considerable lowering. This culvert is indicated at the lower right-hand corner of the accompanying map, and is about 1,900 feet west of the westerly terminus of Barlow street. From levels taken recently by Mr. Barlow, the village engineer, it is found that the top of the present breast wall is $2\frac{3}{10}$ feet, and the bottom of said culvert $5\frac{1}{2}$ feet below the bottom of the abandoned canal, near the foot of

Barlow street. If the said breast walls of the culvert were entirely removed and a proper out-fall secured on the north side of the canal, the old prism on the south side could then be properly drained without appreciable difficulty, as any slight depressions in its bed could be filled in with the material derived from the contemplated deepened ditch; and a similar treatment would easily dispose of the small pond indicated on the map, and lying between the old and the new canal. On the north side, between Main street and the aforesaid culvert, there are two intermediate drainage ditches, which, if properly cleared of accumulated silt and rubbish, will serve to remove the water standing on the old canal's bed. It is asserted by several residents that these ditches were originally constructed by the canal authorities and are to be maintained by them, in which event a proper request to the Superintendent of Public Works of the State will doubtless receive prompt attention. On the other hand, if it should be found that the swampy areas have been legally released to private parties, and that the State has no direct responsibility in the premises, then the matter can be dealt with by the local board of health in the manner prescribed by law and applicable to such cases.

THE INSUFFICIENT DRAINAGE DITCH.

The third and last nuisance complained of at Canastota is a drainage ditch, running northerly from the canal in the eastern part of the village. The principal difficulty here appears to be that said ditch is not provided with a sufficient out-fall, and that it is subject to overflow in times of heavy rainfall and freshets, thereby rendering the cellars of contiguous dwellings wet and damp. It is also asserted that a few privies are built directly over this ditch on premises south of the canal, and that the offensive matter therefrom is occasionally washed down and gains access to the cellars above mentioned. The village authorities have lately diverted the discharge of this ditch into a 12-inch pipe sewer running westerly into Canastota creek, at the same time replacing the former outlet by another similar sewer running a few hundred feet easterly. These two lines of pipe are insufficient to receive the volume of water carried by the ditch in freshets, and an overflow is the consequence at such times. It should also be remarked that the original out-fall of said ditch was equally inadequate, and that the inconvenience experienced by an overflow is only of short duration.

In view of the fact that the ownership of the ditch in question is not definitely known, and that any nuisance arising from the use of privies built over the same can easily be abated by the local board of health, further comment upon this case does not appear necessary until additional investigations clearly demonstrate the need for any assistance from the State Board of Health. It is said that the canal authorities a number of years ago wrongfully altered certain natural drainage lines on the south side of the Erie canal, and thereby diverted the drainage from a considerable area into the ditch complained of, thus causing the overflows mentioned. The village authorities should carefully examine into the facts, and if the allegations are correct, proper redress must be sought from the Superintendent of Public Works, otherwise the expense of making the necessary changes will fall upon the village.

Respectfully submitted.

EMIL KUICHLING,
Civil and Sanitary Engineer.

APPENDED STATEMENTS.

LAW OFFICES OF BRIGGS & WILLIS,
1 AND 3 DELANO BUILDING,
CANASTOTA, N. Y., *May* 17, 1887.

EMIL KUICHLING:

MY DEAR SIR.—I write you at request of Dr. Knapp, of our board of health. I have lived where I now live, within a few rods of the pond so called—a very great nuisance—about 15 years. The street near it is a beautiful street and, but for the proximity of the pond, which now emits a terrible stench, would be healthy. We have lost in the last few years a large number of our citizens and children, which I and others attribute to this nuisance. My wife, Mr. and Mrs. Anderson, three children in one family, Mrs. Green, Mrs. Haight—Mr. Gates, and really a grandson, *et al,, et al.*

There can be no good reason why the nuisance should not be abated.

There is a decision in the Report of the State Board of Health of 1883, page 402, which seems to me covers this case.

Very truly yours.

LORING FOWLER,
Attorney, etc.

To the Board of Health, Canastota, N. Y.:

GENTLEMEN.—I have been a resident in Canastota nearly two years. I am located on Peterboro street. My lot lies adjacent to the millpond lying just west of said street. At times the water in said pond comes (by reason of the dam on the north end of the pond) nearly to my barn; again the pond is nearly dry, at which times there arises offensive exhalations which I consider very unwholesome.

I feel confident that my daughter has been seriously affected with malarial disease, which I attribute largely, and may say almost entirely, to the existence of the said pond. I do not wish to injure the owner of property. If after examination by competent authority there is damage accruing, the owner should be awarded a proper amount.

I make this statement because I deem the health of the community and the reputation of our village of greater consequence than the pecuniary interest of any one person.

Very respectfully.

J. W. BRUCE.

CANASTOTA, *May* 19, 1887.

A resident of this village, Canastota, for the last thirty years, living and owning a residence near and adjoining Canastota mill-pond for about eight years, I would say that quite frequently and especially during the hot dry weather the odor arising from the pond to be very offensive, so much so, that it sometimes became necessary to close windows, when the wind was from that direction.

Public rumor says that the pond is a nuisance and ought to be done away with.

E. A. HAINES.

CANASTOTA, *May* 24, 1887.

CANASTOTA BANKING HOUSE,
CANASTOTA, N. Y., *May* 25, 1887.

J. W. KNAPP, M. D., *Health Officer of Canastota, N. Y.*:

MY DEAR SIR.— As per your request I make the following statements in relation to the Jarvis mill-pond in said village :

First.— Said pond does not hold much water, being quite shallow.

Second.— Have seen the surface covered with water and within a short time have seen little or no water therein—this being warm weather.

Third.— I have known said pond at least 35 years.

Fourth.— From the speech of people living near and about said pond should have no hesitation in saying it was very unhealthy.

Respectfully yours, etc.

MILTON DELANO.

CANASTOTA, *May* 17, 1887.

To the Honorable Board of Health of the State of New York:

DEAR SIRS.— I am requested by Mrs. Nellie M. Jarvis, of Canastota, the owner of a certain grist mill in the village of Canastota, Madison county, N. Y., to communicate to you some facts concerning the acts of a board of water commission who have diverted the water that was owned and used by her in running her mill, and the board of health that complain that the water in her mill-pond is a source of malarial disease and a nuisance in the village of Canastota.

The stream of water on which is that mill-pond runs north through the village near the center of it. The mill-pond is on the direct channel of the stream of water. The mill and pond are located in the south and highest part of the village, now occupied by citizens of the village. That mill-pond, I am informed, has been in that precise place and form for more than 70 years. No individuals are known to own land within several miles of that pond who have not come into their possessions many years since that mill dam was built and used as a mill power for the benefit of the citizens of that village and vicinity. I have known that mill-pond more than forty years and my family residence for more than twenty years has been within about one mile of that mill and in full sight of it from my home. Nearly all my milling business for a farm of 60 acres has been done at that mill for a little over 21 years past. Canastota is the place of business for myself and family—for church, schools, stores, mechanic shops and their wares, physicians, lawyers, mail matter, religious and social relations are mainly found for myself and family within that village. My only direct route from my home to the business part of that village will require me to pass within ten rods of that mill and pond. Neither I nor any of my family have ever detected any odor or known of any malarious disease that could be traced to that mill-pond as a cause. That stream is made from springs of water that flow from the high lands south of that village from 4 to 6 miles. The water passes through no swampy lands, but over dry and arable land, suitable for grain or grass growing. Much of the bed of the stream is either rock or gravel for some miles above the dam, and is a real trout creek, without any swamp land from its source to the mill-pond. About the 1st of October, 1885, a water commission was organized in Canastota to furnish the citizens with water. They built a reservoir about two miles above the mill and have diverted so much of the water as to destroy the water power for running the mill, and now are complaining that the pond is a nuisance, and are taking steps to compel the owner to destroy the dam and excavate the bottom of the dam at the expense of the owner, without any pay, while the attorney they employ declares he will not pay the owner any damage, but will fight the owner if any effort is made to collect damages. The inquiry may arise who is conducting this villifying report concerning that property? The youngest and I think the man of the least experience of any physician in the village. There are three physicians living in Canastota who have practiced medicine from 35 to 50 years in this place, but they have never been consulted by the board of health or by any member of that board. I am informed that all three are of the opinion that there is no just complaint of that kind, and further that they never heard of any such complaint till after that board or commission had seized that water power greatly damaging the mill, and in fact destroying the most valuable water power in the county and following it up with an utter neglect to remunerate the owner for the damage done to her property and then calling it a nuisance when in the judgment of the best medical advice that is within reach there is no just cause for such allegations as are made. I will here give you the names of three physicians with whom you can correspond on any subject relative to these allegations and obtain intelligent and truthful information. They have practiced medicine in this town from 35 to 50 years and have ever been considered men of good ability in their profession. Their names are as follows: Drs. M. Jarvis, V. W Mason and H. H. Hemstreet. The last two are still in lucrative practice, while Dr. Jarvis through age and infirmities does not practice a great deal, but is often called on as counsel. There has been a serious epidemic of diphtheria in our village the last winter, but much the greater number of cases were in the northern and lower part of the village and quite away from the influence of the atmospheric effects of that mill-pond. Indeed I am informed to-day by one of the most intelligent physicians of our village whether there has been a single case in the vicinity of that mill-pond of malarious disease during the epidemic of last winter or spring is a serious doubt. I hope, dear sirs, your honorable body will give this subject a serious and candid consideration before you decide a question that I think is started to secure the most unjust and ungenerous transaction to defraud the owner of that property of her just rights and only means of support.

I remain your most obedient servant.

L. H. STANLEY.

REPORT

ON THE

Safety and Sanitary Condition of School at Westchester, New York.

By Chas. C. Brown, C. E.

Union College,
Schenectady, N. Y., *Nov.* 23, 1887.

Dr. Lewis Balch, *Secretary State Board of Health, Albany, N. Y.:*

Dear Sir.— In accordance with your instructions, I proceeded yesterday to Westchester and examined the school-house just erected, as to its safety and as to its sanitary provisions, and make the following report:

I found a two-story brick building about 76x100 feet, with large stone basement, with ten school-rooms and a large assembly room, in the upper floors, and play-rooms and steam-heating apparatus in the basement. Walls and floors seem to be all of good construction and ample in safety.

The halls are central, one in each direction, on the first floor, and the same on the second floor, excepting that the front half of the longitudinal hall is thrown into the large assembly room. The halls are rather narrow, and the two stairways which are placed in the side halls are very narrow, only about 3½ feet wide and steep, the rise being nearly one horizontal to one vertical, of poor design for so large a building and with a large assembly room on the second floor. The balustrades to the stairways and to the landings on the second floor are very weak and add so much to the danger of the stairways in case of a panic and a rush from the upper floor as to demand an immediate replacement by a stronger structure, or ample bracing by tie rods to the floors and braces to the walls.

The assembly room occupies the entire front of the building, and is about 68 feet by 51 feet floor. The roof is carried by three trusses running lengthwise of the building, having points of support upon all the walls crossed. The front half of each truss spans the assembly room (51 feet), and is practically independent of the rear half. There is no question of the safety of the rear halves of the trusses, owing to their having each four points of support, and being at the same time of the same dimensions as the front halves, excepting that they are a foot or two shorter. The front halves of the trusses were made too short for the span, and have bearing on their two supporting walls of not over four inches in any case. One truss has a bearing of 1¾ inches at one end and falls short at the other, a bearing being obtained by nailing to one side of the lower horizontal timber a 3-inch plank with six 16 d. nails. The disposal of the pieces in the truss is quite different from that given in the plans of the building and the sizes of the pieces are less, but the truss is still strong enough for its load with the single exception that no provision has been made for carrying the tension of the upright pieces to the lower horizontal member. And it is only the stiffness of that member which prevents the truss from pulling apart at those joints. This criticism applies to the rear halves of the trusses as well as to the front halves. The roof slopes at the sides from the side trusses to the eaves, and inadequate provision has been made for resisting the overturning tendency of the load thus applied against the sides of the trusses.

It is recommended that a proper bearing of the trusses on the walls be obtained as follows: For the ends of the trusses on the front wall, two pieces of timber 3 inches by 12 inches by 3 feet, one on each side of the lower horizontal member, and projecting about 7 inches beyond its end should be bolted to the timber by at least 4 bolts, each 1½ inch in diameter. The splicing pieces should have a filling piece bolted in between them beyond the end of the main timber by 2 smaller bolts, and should rest at least 7 inches on the wall. For the ends of the trusses resting on the inner wall of the large room, it will be sufficient to bolt the pieces, 3 by 12 inches by 3 feet, to the two sections of the horizontal member meeting there by 2 or 3 bolts in each piece. The following construction will properly unite the vertical pieces with the horizontal ones: Stirrups of wrought iron ½ inch by 2 inches by 4 feet, or 4 feet 6 inches bent to surround the horizontal member on three sides and project about 9 inches on each side of the vertical member, bored with holes to allow ¾ inch bolts through the strap and vertical member. The bolts should be 3 inches apart with one 4 inches from the end of the upright. A piece of timber 3 by 6 inches by 1 foot 6 inches should be laid on top of the upper horizontal member before the upper stirrup is put in place. The middle vertical member is supported on a wall and will not need this addition, but both ends of all other vertical members in the trusses will need it. Four straps each 4 feet long and 4 straps 4 feet 6 inches long will be needed for each truss. Reference is made to the accompanying tracing for a sketch of the methods of repair suggested. The original plan seems to call for trusses transverse to the main trusses to carry the thrust from the side slopes of the roof. These have been omitted in the construction. Timbers 6 by 9 inches put across between trusses at each intersection of 2 pieces on the upper horizontal member abutting against those members and fastened in place will supply the needed lateral stability. Fourteen such pieces, 6 by 9 inches, and as long as the distance between trusses (about 16 feet) will be necessary.

A pleasing architectural effect could be produced by using brackets on the wall in the room below to support the ends of the roof trusses, in place of the splicing recommended above. As two of the trusses rest on the walls directly over doors or windows, two brackets placed on the solid wall, with a cross-piece for supporting the truss, would be better construction than a single bracket immediately above a door or window.

The roof is in bad condition as to drainage; the gutter spouts being above the gutters, so that water stands in a trough all round until evaporated. It is a question of but a short time until the tin roof rusts sufficiently to cause numerous bad leaks. A cross section of the roof would show it nearly flat in the central portion, with a slope of 1 vertical to 3 horizontal on all sides for about 18 feet from the gutters, with a high and wide cornice, making an excellent roof for catching and keeping in snow and rain to load up the roof and to rust it out.

The stairways and the plan of the roof are to be attributed to the design, the faults in construction to the contractor or to the inspector for not holding him to the specifications.

The plan of the out-houses is very bad. There are two privies, one for boys and one for girls. Each is but a row of holes in a board along the longer side of a room about 10 feet by 18 feet or 20 feet, with no attempt at partitions to secure the least privacy, thus making them, even more than the ordinary school out-buildings, open schools of vice. The partition between the two privies is entirely too light, being only of light matched ceiling lumber. The row of holes is over a trench of brick, which leads to a cess-pool, the trench to be flushed by a pipe said to be $\frac{7}{8}$ inch in diameter under a head of about 35 feet, being fed from a tank in the attic. This is entirely insufficient for keeping the trench clean. A 3-inch pipe would be none too large for

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the purpose, and the tank should act automatically to flush the trench at regular intervals. However, as the tank is filled by a steam-pump, which will not be used in warm weather, and is liable to freeze in cold weather, it does not seem to be of much use.

Cisterns and a well are provided for furnishing water to this tank and to the steam-heating apparatus, and the statement is made that they are not to be used by the children for drinking purposes. No other water is provided for them, however. The cess-pools (one for each privy) are about 12 feet deep and the well 14 feet. The nearest cess-pool is not more than 60 feet from the well, and a close connection between them was shown by the variation in level of the water in the well with that in the cess-pools during their construction. The subsoil is gravelly and porous, and a well anywhere on the premises would, doubtless, be a dangerous source of supply for drinking purposes. If the cess-pools are retained, arrangements should be made for thoroughly filtering the cistern water for such use.

In view of the facts that the tank will not do good service in flushing the trench, that some expense will be necessary, as shown below, to make the foundations of the tank safe; and that the cess-pools will pollute the water supply, it may be cheapest and best to abandon the cess-pools, *filling them up completely*, and turn the present closets into earth closets, with arrangements for periodic removal of the deposits. In such case the closets should be water-tight, and might well be in the form of boxes to be hauled out and emptied.

The tank in the attic, which when full of water will weigh nearly 10,000 pounds, is supported upon 4 joists, each 1¾ by 6 inches, and about 10 feet long. The ends of the joists rest on a strip 1 by 2 inches in cross section, nailed to the side of a larger joist by 8 d. nails. The only wonder is that the tank has not gone through the ceiling by its own weight. Its foundation should be carried directly upon the walls, and not upon other timbers as now, and four timbers, each 4 by 16 inches, in cross section would not be too large for the work to be done.

While the roof is not at present dangerous, it will become so upon the first heavy fall of snow. The balustrades of the stairways are dangerous at any time of panic; the tank is ready to go through the ceiling as soon as it is filled; and, last and greatest, the pollution of the water supply is sure, and the plan of the privies is opposed to good morals. It would seem to be the best course not to begin the use of the building for school purposes until these errors are corrected.

Respectfully submitted.

CHARLES C. BROWN, C. E.

REPORT

ON

Mill-Pond Nuisance at Canaan, Columbia County, New York.

By F. C. Curtis, M. D.

Albany, *April* 29, 1887.

Dr. Lewis Balch, *Secretary of the State Board of Health:*

Dear Sir.— My investigation into an alleged nuisance at Canaan Centre, Columbia county, to-day, brought to light the following facts:

The cause of complaint is a pond used as a storing reservoir for a mill situated some distance below. It was constructed three or four years ago on what was an old, but long disused site of a mill-pond. A dam across a small ravine confines the water of a mountain brook for a little distance between precipitous banks; it sets it back, however, above this so as to flood a very extensive area, so nearly level that the water is probably hardly more than a foot deep. While formerly swampy and covered with coarse grasses it was also overgrown with alder bushes; these the standing water has killed and they furnish a large amount of decomposing vegetable material. The edges all about it are swampy and grown up with coarse grass. As the water fails, usually in late summer, this supply is drawn upon, alternately exposing and submerging more or less of this large shallow area.

The highway skirts the meadow lot in which this pond lies, but not in close proximity, except as points of its irregular outline bring submerged land near it. Along this highway a scattered cluster of half a dozen houses and a church compose the little hamlet, the residents of which are the complainants in this case. The complaint is that there are disagreeable swampy odors arising from the pond, that it brings swarms of mosquitoes and that it is a source of sickness of a malarial character.

The type of sickness that would be looked for from these paludal conditions described would be well marked malarial disease, and gastro-hepatic disturbances and lowered vitality that might impress itself variously according to individual idiosyncrasies, these being milder manifestations of malarious poison. These would be intensified in summer and early autumn, while in winter they would be in abeyance. Visiting all the houses, I found no evidence of decided malarial disease, none at least originating there; there were one or two who were subject to the disease from having contracted it elsewhere who experienced return of the familiar symptoms. It should be said that this region is notably free from malarial disease and is for this reason resorted to in the summer by those subject to it. One case of daily periodic headache was noted, but its malarial character is not certain. As to other disorders, there was perhaps no more than would be observed in any similar community, neither was there any periodicity to the symptoms, nor other evidence of their being of malarial origin.

It appears then that the pond has probably been to a small degree a source of sickness, although as yet it has not been a serious factor in the production of disease.

But as it exists, it is pretty certain to be a menace to health. The alternate submerging and exposing of this large surface of swamp land will, according to all experience, have a deleterious effect on those living in its vicinity. This will be more likely to show itself as the decomposition of vegetation covering the ground becomes more complete. I speak only of vegetable matter, since I believe no animal waste finds its way into the pond. It is just these conditions which favor the development of malarial disease, and this development will depend on the region in which they exist. There are localities absolutely free from malaria where such ponds have been perfectly harmless. This condition is true regarding the immediate vicinity under consideration; but under just such conditions malarial diseases have been developed at various points of these Berkshire hills, a familiar case being that of Lenox, ten or fifteen miles east of this place. I should anticipate that at some time this might occur here.

As to the remedy, there is perhaps none, except to discontinue the use of this pond. I would suggest that it might be possible, though, for the dam to be moved further down the little ravine, and built of such a height as not to flood the large level area. If this could be avoided and the pond maintained between the precipitous sides of the ravine only, the evils that are threatened, or actually exist, would be entirely removed. I would suggest that some such adjustment of the matter be undertaken by the local board of health.

Respectfully yours.

F. G. CURTIS.

REPORT

ON THE

Sanitary Condition of Southampton, Long Island.

By O. S. Wilson, C. E.

To Hon. Salem H. Wales, *President Village Improvement Association of Southampton, Long Island:*

Sir.—At the request of your association I visited Southampton on the 12th inst. to inspect its sanitary condition and suggest means of rendering less likely a repetition of such a scourge as it is now passing through and the effects of which it is hoped will not be more disastrous. As to the

Typhoid Fever.

I found that this originated in Mr. Hildreth's boarding-house by the importation of a case from a distance. Just how it spread to the different persons affected at the Hildreth boarding-house is perhaps difficult to ascertain definitely, whether from the careless handling of clothing and the various utensils of the sick room, the character of the fever does not seem to have been at first fully recognized and the proper precautions taken, or from the pollution of the water used for drinking and culinary purposes.

It is generally conceded that typhoid fever is caused by a specific germ that must be taken into the stomach and bowels where, if the conditions are favorable, it multiplies and is passed off.

The Water's cases and the one now about to terminate fatally were doubtless contracted from the careless disposition of the water used in cleansing the linen from the bed and patients at the Hildreth house, and doubtless could have been prevented. It is known that where a whole family is exposed to the action of this germ, that it does not necessarily follow that all will have the fever, nor do all that have the fever die. Those who have naturally weak constitutions, and others usually robust, but who are debilitated or worn out, are the ones to suffer most.

In Southampton there have previously been cases of this fever at periods of 4 to 6 years; generally one or two cases, some of which have resulted fatally. Until within a few years it has been thought that all such cases were special visitations of Divine Providence and were taken by those religiously inclined as warnings to foresake the evil paths of this life and prepare for the future. This is all very well in its way, but the same Providence has led men to investigate, and it has been found that these "special visitations" can be very materially lessened in frequency and effect by a due regard to proper sanitary surroundings. To use the old clerical reasonings this last visitation by which two and doubtless three lives will be lost is intended to impress upon the minds of the residents that this charming village to which so many flock for health and relaxation, and which on the ground of healthfulness mainly is now enjoying a remarkable boom financially in real estate, contains something besides the fountain of perpetual youth, and it behooves all those interested financially in this locality to see that the famed healthfulness of Southampton is maintained.

SOIL AND SEWAGE DISPOSAL.

The soil of this region is sandy loam to a depth of 1 to 4 feet, under which lies sand and gravel with occasional small pockets of clay. The ground water lies from 6 to 20 feet below the surface which is quite even and flat generally.

It has been the custom from the beginning of the settlement, over 200 years ago, to have shallow—if any—privy vaults and to remove occasionally and distribute on the land the contents of the same. This would seem to be an advanced idea in sanitation, but it is presumed to have been done more from an economic stand-point. The dish and laundry water was thrown on the surface of the ground.

Less than 50 years since cess-pools constructed loosely to allow the fluid contents to soak away were introduced in places. During the past 10 years cess-pools constructed to hold all contents have come into use. These are cleaned often, the contents being spread on the surface of the ground away from dwellings. Such an arrangement will answer for a time so long as the dwellings are separated, and until the ground becomes so saturated as to endanger the pollution of the ground air and water. We are told that the soil beneath this village is a perfect filter, and is so composed that it will purify sewage. So it will for a time, but like many house filters that people use year after year without renewing, congratulating themselves on their pure water supply, when in fact the filter adds poisonous germs while seeming to remove the color from the water put into it. This is doubtless the case with the soil underlying Southampton. There is no doubt but that this soil, in the vicinity of the older residences especially, is thoroughly impregnated with filth and germs of different forms of disease that are driven still lower by rains, and after reaching the ground-water flow along toward the ocean until intercepted by some well whence they are taken to be incorporated into some human or animal system. Water thus slightly polluted may be used with impunity. It is only when some disease germ is thus incorporated that any serious harm is done. This is theory to be sure, still it is only to point out the danger that threatens the whole water supply of the village as now obtained. Said danger is the more threatening as the village is increasing rapidly in size; there being more pollution put into the soil, also more wells to remove it.

In my report last year mention was made of this dangerous method of water supply. Admit there is any truth in the above, what a site has been selected for a school-house; only 5 or 6 feet above the ground-water, a quarter of a mile from and below the cemetery, a few hundred feet from a marsh that all admit it has been—if it is not now—polluted and which is also in the line of ground water flow from half the older part of the village. A pipe is driven into this ground-water, a pump attached and the innocent children God has given you, asked to drink the water therefrom. Should an epidemic break out in your school, which God forbid, and many of your dear ones be taken, call it something besides a special visitation of Divine Providence.

RECOMMENDATIONS.

Having pointed out what seems to me to be the greatest source of danger to the health of your village, it is fitting that some feasible method of overcoming it should be suggested. You have no stream of pure water near to afford you a suitable supply, so I would recommend putting down deep wells. These have been found satisfactory on the west end of the island and on the north side of the sound, and there is no doubt but they will prove equally so in your locality. The first one will be something of an experiment regarding cost, but not as to results — if properly managed. The first well should be drilled about 6 inches in diameter until clay or rock is found. The surface water should be "cased" out with iron pipe, which can be obtained in suitable lengths to screw together. Through this clay or rock the well should be sunk until a supply of water satisfactory in amount and quality is met, which will almost certainly be found at less than 500 feet. It is possible you might obtain a flowing well, but with no considerable head to force it through pipes over the village. It certainly would rise within pumping distance of the surface and water could be found in quantity sufficient to make one well supply the whole village, as now laid out, with abundance of pure, wholesome water. It may be that at 100 or 200 feet a suitable supply could be obtained. That can only be determined by experiment. To be sure such a supply would be expensive, and this would be an objection all would raise, still the advance in the last five years on a dozen acres of your unimproved land would cover the outlay for a complete water system that would give you not only a house supply but water for street sprinkling and fire purposes, which is desirable.

As for sewage disposal I would recommend for the present the general adoption of dry earth, tight privy vaults, and tight cess-pools, both to be cleaned often and the contents spread thinly over the soil and ploughed in. With the above water supply the old wells would be abandoned, still care should be taken not to further pollute the ground air, which is a matter too often neglected.

CHEMICAL ANALYSIS.

I made collections of water from the Hildreth and Fondey wells, which were analyzed by Dr. W. G. Tucker, a well-known and trustworthy chemist, a copy of whose report on the same is appended. The samples were numbered as follows:

"No. 2, H." Water from Mr. Hildreth's well under the house.

"No. 3, H." Water taken from the new well lately driven by Mr. Hildreth and which is about 150 feet from the other and away from buildings, although it is only about 60 feet from where a privy stood for years.

"No. 4, F." Water taken from the well in the cellar at Mrs. Fondey's house. There is a well about 40 feet from this, but outside the house; both are used. This one was selected as being most likely to be used, on account of its being more accessible to the kitchen. This place has been occupied but about three years, and is in what may be called the new part of the village.

By comparing the water analyses below, it will be seen that the water from both wells of Mr. Hildreth would seem to be very fair chemically, but that from the new well is the most unwholesome. This well was driven after the recent outbreak of fever there, on the supposition that the old well was contaminated from the cess-pool, etc., near by. While it is difficult to say that it is polluted, there is no question that it is a dangerous source of supply on account of its surroundings, being under the house and an open or dug well with but twenty feet to the surface of the water. This house is about a quarter of a mile from any other dwelling and one would think that by getting away from the house and out-buildings no difficulty would be experienced in finding pure water. Whether the new well is affected by the old privy is mere conjecture. It may be that its poorer showing by chemical analysis is accidental. There can be no hesitation in pronouncing both dangerous.

Chemical analysis does not show the presence of disease germs. It is mainly useful in detecting the presence of sewage. If the contents of a cess-pool leach into a well, it is reasonable to expect disease germs; it certainly can not be called a safe potable water. If the wells at Mr. Hildreth's are to be used, it would be much safer to boil all the water before using it for any purpose. It would seem possible that the recent cases of fever there were conveyed from the first case by means of the various utensils of the sick room.

In the case of fever at Mrs. Fondey's house, it would seem to be more probable that it was contracted from using the well water than that it was caused from drinking milk that may have come from Mr. Hildreth's.

It would be interesting, from a scientific stand-point, to have water from some of the old wells in the more thickly settled portions of the village analyzed, and have the people using the water realize what risks they run in doing so. Water from a well 200 years old that "never fails," and is "cold as ice," is very suspicious and needs investigating.

In the preceding pages it has been my aim to point out a danger that threatens all the people living there, rather than to try and find out the cause of the recent affliction and deaths. It is my judgment that the scenes of the past few months are likely to be repeated at any favorable time until you take measures to render your sanitary surroundings less dangerous.

Yours, very respectfully.

——— ————.

ALBANY, *October* 20, 1887.

ANALYSIS OF POTABLE WATER.

Parts in 100,000.

Source, from O. S. Wilson; "No. 2. H.;" date when received, October 15, 1887; color and appearance, transparent, slight greenish tint; odor at 100° F., none.

Chlorine	2.80
Free ammonia	0.0054
Albuminoid ammonia	0.0050

Total solids (almost colorless)	11.20
Loss on ignition (no darkening or odor)	3.80
Mineral matter	7.40
Nitrates	Present.

Remarks: Chlorine and free ammonia not excessive; albuminoid ammonia, low; total solids and loss on ignition, low. Nitrates present, but water can not be condemned on chemical grounds alone.

CHEMICAL LABORATORY, ALBANY MEDICAL COLLEGE, *Oct.* 19, 1887.

W. G. TUCKER,
Public Analyst.

ANALYSIS OF POTABLE WATER.

Parts in 100,000.

Source, from O. S. Wilson; "No. 3, H.;" date when received, October 15, 1887; color and appearance, transparent, slight greenish tint; odor at 100° F., none.

Chlorine	3.20
Free ammonia	0.0060
Albuminoid ammonia	0.0015
Total solids (colorless)	10.80
Loss on ignition (no darkening or odor)	4.20
Mineral matter	6.60
Nitrates	Present.

Remarks: Chlorine and free ammonia not excessive; albuminoid ammonia very low; total solids and loss on ignition, low. Nitrates present, but can scarcely be condemned on chemical grounds alone. Like No. 2, but not quite so good.

CHEMICAL LABORATORY, ALBANY MEDICAL COLLEGE, *Oct.* 19, 1887.

W. G. TUCKER,
Public Analyst.

ANALYSIS OF POTABLE WATER.

Parts in 100,000.

Source, from O. S. Wilson; "No. 4, F.;" date when received, October 15, 1887; color and appearance, greenish tint. Very slightly turbid; slight sediment; odor at 100° Fahrenheit, disagreeable.

Chlorine	2.75
Free ammonia	0.0107
Albuminoid ammonia	0.0105
Total solids (grayish white)	18.60
Loss on ignition (blackening and slight odor)	7.60
Mineral matter	11.00
Nitrates	Present.

Remarks: Chlorine not excessive; free and albuminoid ammonia excessive; nitrates present; water probably polluted by sewage; decidedly worse in most respects than Nos. 1 or 2.

CHEMICAL LABORATORY, ALBANY MEDICAL COLLEGE, *Oct.* 19, 1887.

W. G. TUCKER,
Public Analyst.

No. 4 is doubtless polluted by animal matter. Nos. 2 and 3 are better, but may be polluted, and if such pollution is probable or possible, I would not recommend their use, even though the chemical results are no worse than they are.

Yours truly.
W. G. TUCKER.

REPORT

ON THE

Sanitary Condition of the Mount Airy Hotel, Saugerties, N. Y.

By Thomas Dawes, M. D.

STATE BOARD OF HEALTH OF NEW YORK,
SAUGERTIES, *November* 8, 1887.

LEWIS BALCH, M. D., *Secretary of State Board of Health:*

SIR.— In accordance with your request, accompanied by a report from Cyrus Edson, M. D., chief health inspector of the city of New York, stating that there were seven cases of typhoid fever (giving names and residences), which were contracted during the past season Mt. Airy Hotel, or summer boarding-house in the town of Saugerties, kept by S. F. Hommel, I have examined the house and surroundings, and also have taken measures to ascertain if there were other cases of typhoid fever which were probably contracted at that place.

I addressed a letter to Dr. Warren Kemble, health officer of the town of Saugerties, asking for whatever information he might have upon the subject, and also one to Dr. Chas. D. De Witt, who lives in the immediate vicinity, and is the physician who attended the family of Mr. Hommel and the inmates of the house, as well as those in the neighborhood who were said to have had a fever supposedly contracted at the above-named boarding-house. Copies of these letters accompany this report. Health Officer Kemble promptly reported, and his reply accompanies this report. Dr. DeWitt did not notice my request or answer my letter.

Upon inquiry of the people living in that neighborhood, I found that the sentiment was strong and growing more pronounced, that the numerous cases of sickness in that vicinity were typhoid fever, and that the proper authorities as well as the public were kept in ignorance by the proprietor of the hotel and attending physician, for fear of injuring the former's business, to say nothing of that of the latter.

On the 2d of November, 1887, I visited the place accompanied by Dr. S. L. Dawes, who took notes for me and who had furnished a very correct diagram of the hotel and surroundings which find inclosed. Health Officer Kemble was also present and furnished valuable assistance in the investigation.

The hotel or boarding-house is situated on a bluff about 500 feet above the Hudson river which is distant about 2½ miles. The front of the house is almost 80 feet from the edge of the east bank, and is about 80 feet higher than the rear. The bluff is of a rocky formation underneath a gravelly loam of from 2 to 3 feet in thickness; at the rear of the house commencing north of the cottage and privy (see diagram) and descending south to far below the barn is a depression or valley in the rocky substratum, which would be represented by a line directly through the centre of the house and bar-room and the western border by the west bank. In the center of this valley a well is sunk in the rock 22 feet, distant 27 feet from the corner of the basement and kitchen where the waste and slops are thrown into the drain, which is made of stone without mortar or cement. The drain commences at the south-western corner of the house and runs in an easterly direction through the bank to the front of the house, 130 feet, with but 6 feet fall. Whatever reaches its outlet (if anything could through the stone drain with so slight a fall), would send its odor and whatever germs there might be, directly up to the front of the house if the wind was favorable. Just 8 feet north of, and above the well was found the laundry, where all the washing for the boarders was done, and in a direct line up the valley 130 feet from the well and 37 feet from the north-west corner of the house were two privies with vaults 11 feet deep, laid up with loose stones in the gravelly soil and which were not intended to be emptied. Mr. Hommel stated, however, that lime was thrown in daily. There is a pipe 1½ inches in diameter leading from outside a window on the south side of the house, third story, where the servants emptied the waste water and sometimes the contents of the chamber pails. This pipe leads to the drain, before mentioned ; it is said to have a trap with rubber ball valve. There was sufficient evidence to my mind, that perfect drainage and the situation of the well in the valley and its relation to the laundry, privy and drains was such as to favor the development of typhoid fever and kindred ailments. This opinion was concurred in by the two physicians with me. I think it necessary, in order to protect the inmates of the hotel, that the privies should be moved farther north-west and that the vaults (or whatever be used), should be made tight so that the soil above the rocks should not be contaminated. The laundry should, also, be

below the well farther down the valley, and the drains should take a southerly course and reach below the barns, and should be laid in cement. The well might then, possibly, be used, but still it is in a place to received all of the wash from the hill on the west, covered with decaying vegetable matter, and all that percolates the gravelly soil in the valley north of it.

In view of the fact that the existence of typhoid fever at the house and in the vicinity, having its origin at the hotel, has been persistently denied by Mr. Hommel, the proprietor, and not reported by the physician in charge for fear, as he said (see statement of Mrs. Wolven), that it would hurt Hommel's business, I have questioned Mr. Hommel regarding the matter. His answers concerning those sick at the house, as well as those taken after leaving, are given, and the statements of the persons themselves are also submitted. They go far, in my mind, to corroborate the view that typhoid fever originated at the hotel for want of sufficient sanitary precautions, and also to establish the correctness of Dr. Edson's report to the health department of New York city.

Very respectfully yours.

THOS. S. DAWES, M. D.,
State Commissioner of Health.

STATEMENT OF S. F. HOMMEL.

S. F. Hommel, proprietor of Mount Airy Mountain House, states that a Mrs. Myer and three daughters, of New York city, came to his house on July twelfth. One daughter was sick with some kind of fever. That through the advice of Dr. Charles D. De Witt, of Quarryville, he sent them away on August first.

That his wife was sick about September first, and remained sick for about two weeks. The doctor said she had some kind of fever;

That his son had the measles;

That S. Winkler worked for him as bar-tender until September thirteenth, when he left him, sick with some kind of fever, and returned in twenty days, and is with him now;

That Christopher Mower, living in a cottage a short distance south of the hotel, has been (and is now) sick for three weeks with typho-malarial fever;

That Henry Balin came to his house from some other boarding-house sick, and improved rapidly while at Mt. Airy;

That Miriam Balin had a bad cough, but was not sick;

That the Balins remained at his house longer than they would otherwise have done, because of the fact that in the street on which they lived in New York city, the gas-pipes were being relaid and they feared sickness from that cause;

That Miss Annie Taylor occupied a room in his house that had been formerly occupied by Herman Basch, of New York, No. 118 West Sixty-first street, and who came to Mount Airy sick; he remained at Mount Airy six weeks, returned to New York, and in three weeks died; his physician was a German one of New York city. His death occurred in August, and was from some fever.

Statement of S. F. Hommel in regard to servants and in regard to Wolven and statement of Wolven's mother. Also statement of servants:

Hommel states that ——— Wolven, of Quarryville, who has since died (as death certificate of Dr. DeWitt shows) from typhoid fever, had been at Mount Airy no more than four times during the summer, and never in his house; that he slept one night, drunk, in one of his carriages.

Wolven's mother states that her son was a frequenter of Hommel's place, being there always as often as twice per week, and frequently oftener, going there to see the "girls" (servants); that Dr. DeWitt attended her son; that Dr. DeWitt told her that he had at one time seven cases like her son's, and that the most serious one was that of Mrs. S. F. Hommel (see Hommel's statement as to his wife); that she asked the doctor particularly if Mrs. Hommel had typhoid fever, and that he said yes. That the doctor said it all came from a family named Myers, who were sick at Hommel's; that her husband asked him why he didn't tell Hommel to send them away, and he said he was afraid it would hurt Hommel's business (DeWitt is a relative of Hommel's).

Hommel states that a servant named Cody came to his house on July 6, and left sick with measles on July 13. Returned to work July 26 and remained until the close of the season.

Miss Cody states that on July 25 she was taken sick and went home, and was very sick for 15 days, and is not well yet; that she was attended by Dr. DeWitt and had the typho-malarial fever; that Wolven was a frequenter of the house evenings.

Hommel states that a servant named Craft came to his house on July 1 and remained until August 6, returned home sick with measles, and came back to his house on August 9, and remained until the close of the season.

Hommel states that a servant named Vedder came to his house on July 25 and remained until September 5; that she has been sick since with measles, and took quinine all the time she was at his house.

Mrs. Vedder states that she had the measles before she went to Hommel's; that she was at his house six weeks at work, and was then taken sick; returned to Quarryville, was sick in bed for four weeks; that the doctor called it typho-malarial fever, and that she caught it at Mt. Airy. She also stated, in regard to Miss Craft, that she was taken sick three days before she was, and was also sick for four weeks; also that Wolven was a very great deal at Mt. Airy evenings.

Hommel states that a servant named Morse came to his house on July 2 and left on September 25; was not sick at his house at all.

Mrs. Morse states that after leaving Mt. Airy she was taken sick with typho-malarial fever, is now convalescent; that Basch came to Mt. Airy with consumption, and that Miss Annie Taylor did not occupy the same room that he (Basch) had occupied, nor one in the same part of the house (see Hommel's statement); that Wolven was frequently at the hotel; that Hommel's son had the "fever," too (see Hommel's statement); that the chambermaids often emptied the slops into the drain instead of carrying them to the "slop-hole" at the barn.

Dr. T. S. DAWES, *State Commissioner of Health:*

SIR.—In answer to your note of inquiry bearing date of October 24, 1887, would say: During past two or three months it was rumored that typhoid fever was prevailing in vicinity of Mt. Airy and Quarryville. As no report came either to the town board of health or myself as health officer from any physician or householder, as required by rules and ordinance, passed and published by said board of health in case of contagious or infectious diseases, and not thinking it my duty as health officer to prove or disapprove the diagnosis of the physicians, I waited until about the sixth of October when a certificate of death resulting from typhoid fever was recorded with the clerk of vital statistics and signed by Dr. Charles DeWitt, of Quarryville. Still no report coming as required by law, I proceeded to Mount Airy. Mr. S. Hommel, his wife and daughter, all declared to me there had been no typhoid fever there and that the physician had so informed them. Yet Mrs. Hommel, her daughter and son had all had a fever. Mr. Hommel desired me to see a young man who lived in an adjoining cottage. I saw him but could not say positively what fever he had had, as he was in the stage of convalescence. At this time Mrs. Morse, one of the servants, was taken sick at her own house with a fever which I diagnosed as typho-malarial. She was always robust, never having been sick, and she states that she cleaned house (after the people returned to the city) for Mrs. Hommel. Mrs. Morse is now convalescent, after three weeks of sickness. Misses Cody, Vedder and Craft, also servants at the house of Mr. Hommel, have had a fever. A young man by the name of Davis Wolven, who frequented the kitchen at Hommel's, was taken sick with a fever, and this was the case which Dr. De Witt returned on certificate as having died from *typhoid fever*. About this time his (Wolven's) brother came down with a fever and now, two or three weeks after, is convalescent. After the statements made by Mr. Hommel, his wife and daughter, I did not make as thorough an examination as I should had it been otherwise. The privy is about 50 or 60 feet from well. There was a covered drain which starts near kitchen door and runs along the south side of the house, which they say was used only for wash-water, and that all slops from the house was carried to a manure pile at the barn, some 200 or 300 feet or more from house. Of course I have no means of demonstrating truth of above statements. It does seeem that there must be something wrong in the sanitary surroundings of this house or premises to generate so much of even miasm; for Mr. Hommel told me the girls were continually taking quinine. It might be important to note that the well is only a few feet from drain spoken of, though the apparent course of the drain is from the well.

Yours truly.

WARREN KEMBLE, H. C.,
Town of Saugerties.

October 27, 1887.

CONTAGIOUS AND INFECTIOUS DISEASE.

REPORT

ON THE

Prevalence of Diphtheria at Moravia, Cayuga County, N. Y.

By F. C. Curtis, M. D.

Albany, *October* 15, 1887.

Lewis Balch, M. D., *Secretary of the State Board of Health, Albany, N. Y.:*

Sir.—The village board of health of Moravia, Cayuga county, on the 13th of October, reported the prevalence of diphtheria at that place, and requested assistance and advice from the State Board. At your instance I went to Moravia as sanitary investigator, and the following is my report:

The first cases of the disease which attracted the attention of the local board, occurred about 6 weeks or 2 months ago. In quick succession it spread to adjacent families, until in that part of the village where it commenced, hardly a family escaped, and I believe not one in which there were young children. It appears to have been further true that in many of the respective families every child was taken with the disease. There are reported to have been more than forty cases in all, and of these four have proved fatal. At the present time there are a number of cases in the acute stage, but it seems most probable that the epidemic is commencing to wane.

The disease has prevailed by no means generally throughout the village; it has in fact been a well marked epidemic, limited to a large degree to the region in which it seems to have originated. A number of cases have occurred outside of this locality, but they have been sporadic, by which I mean they have not spread from house to house nor shown a disposition to settle and become general.

As to the nature of the disease, it is characterized by inflammation of the mucous membrane of the fauces with exudate. In some I found the nasal passages likewise affected. In most cases the exudate was superficial, but some showed evidence of necrosis of the mucous membrane. All had enlargement and tenderness of the cervical glands. Convalescents showed pretty well marked anæmia as evidence of systemic disturbance usually found following diphtheria. In one there was evidently pharyngeal paralysis, which is one of the sequellæ of diphtheria; in another there appears to have been a diphtheritic exudate upon an open sore on the cutaneous surface. Many, probably the majority, of the cases were of mild type but its possible virulence is shown by the fatal result of four cases. The fact that the disease existed mainly in a limited region and not generally over the village area, which would have been looked for if it had been a simple pharyngitis due to climatic conditions; its affecting almost every family in that locality; that children were principally taken with it, all in a family in several instances being affected; and the especially unsanitary condition of the locality where it chiefly prevailed are facts sufficient to show the diphtheritic type of the disease. There also seemed reason to believe that two of the sporadic cases originated by contact with children from an infected family.

By some observers here the prevailing disease has been regarded as one of simple inflammatory sore throat, and I am told that many cases of this sort have been met with among both children and adults, and attributed to climatic changes. It is quite possible that this being the case, diphtheria has grafted itself upon the simpler disease as it is sometimes seen to do and thus determine the outbreak in the more unsanitary localities. It is an interesting point, well worthy of note and record.

Moravia is a village of about 2,000 inhabitants, built upon a soil of alluvium covered, porous gravel. It has a public water supply but being intermittent and not in general use driven wells furnish its potable water largely; these are from 12 to 20 feet deep and are all in the gravel. Privies, of the primitive sort, with leaching pits, are universal, and all, as far as I saw, in an ill-kept condition. House-waste is disposed of by leaching cess-pools, which in this porous soil readily diffuse their inflow through the surrounding earth, or in many cases the house drain opens into the street gutters. There is one rather considerable stream, very variable in the amount of its flow, running through the village and in some instances privies are directly over it, and garbage is thrown into it. Two or 3 insignificant streamlets also traverse the village, which receive numerous house drains and are mere open sewers.

The limited area where the epidemic chiefly prevailed is at the north end of the main street of the village. It is an elevated and easily drained ground, but the disregard of cleanliness is here particularly marked. The street gutters and two of the streamlets receive house sewage, while the beds of the latter are irregular and clogged ditches; into one of them the water from a cheese factory, the premises of which are very uncleanly, has found its way and the whole is soon precipitated into an undrained marsh, which is a bed of raw sewage and a pestilential spot. The domiciliary conditions, which are of more interest respecting diphtheria than the public conditions, are, I find, often characterized by negligence. In one house, and one of the worst affected, the house drain leaches through the cellar wall, making the bottom quite muddy; in several the waste pipe from the kitchen sink had no trap.

The relations of bad sanitation to the existence of diphtheria are too well known to need comment. Its germs perish in a clean place and thrive in a filthy one. These ill conditions may exist for a long time before an outbreak occurs; then it comes and goes suddenly, as an epidemic of a few weeks duration, some causes, such as those favoring simple throat catarrh determining its appearance.

The radical remedy for diphtheria is cleanliness; in the case of Moravia, this means finding a better disposal for sewage than emptying it into little open and clogged watercourses or street gutters, the draining of the sewage-defiled swamp, the cleaning of the privy vaults and substitution for these leaching pits which defile the entire soil, of water-tight and, if possible, dry earth receptacles, and the correcting of faulty domiciliary conditions. It must be apparent that in a loose, gravelly soil the contents of such privy pits and the house sewage either emptying into cess-pools as is common here, or into clogged watercourses, cannot fail to find its way into wells and cellars. The immediate remedy is isolation of the sick and disinfection of the affected premises; Dr. H. B. Baker, of the Michigan State Board of Health has recently compiled some statistics which emphasize very strongly the importance of this.

At a meeting of the village board of health at which a number of other interested citizens were present, I called attention to these general facts and to their application in detail to Moravia. The board has already acted intelligently and discreetly in the matter, and it only remains for more thorough, energetic and radical measures to be taken, not simply to check the present outbreak of disease, which appears to be neither malignant nor disposed to long continuance, but to put the village into a better way for the future, the need of which this outbreak serves well to emphasize.

Very respectfully.

F. C. CURTIS.

REPORT

ON THE

Prevalence of Diphtheria in the Village of Nassau, Rensselaer County, N. Y.

By F. C. Curtis, M. D.

State Board of Health of New York,
Albany, *December* 8, 1887.

Dr. Lewis Balch, *Secretary of State Board of Health:*

Sir.— The history of diphtheria in the village of Nassau, Rensselaer county, the causes of the prevalence of which I went to inquire into yesterday, is that the disease first made its appearance in July, 1886. Prior to that time, the health officer, Dr. Neher, who has been for a long time a practitioner there, says that it has been unknown for many years. Within a short period of time 9 cases occurred in 5 families in and about the village, 6 deaths resulting. In November and December following 2 cases, both fatal, occurred, and again, in February, 2 more, 1 being mild, the other fatal. After an interval of several months, in August last, 4 children in one household took the disease and 1 died. And, finally, in November it again appeared, this last outbreak still continuing at the present time; 12 cases have developed, 3 occurring in one family, 2 in 3 families and a single 1 in 3 families; 2 of these have terminated in death and the rest have recovered, except 3 sick at the time of my visit. The affected localities have been most of them not far apart, but cases have occurred all over the village.

There is good reason to believe that the first cases originated from the adjoining town of Lebanon, where it has been prevalent. It seems to have spread gradually along the communicating highways, and the disease, in fact, is scattered to some degree through the whole township.

Nassau is a considerable hamlet, on an elevated, level site in a country the surface of which is a broken upland, fairly drained and moderately fertile. The surface alluvium lies upon a bed of gravel extending to limestone. The wells are from 15 to 25 feet deep, water being reached in the gravel. The level of ground-water is high enough, I learn, to make many of the cellars wet; all, however, being dry that I examined.

The sanitary conditions of the village are much the same as we generally find throughout the State, and are far from being satisfactory. The leaching privy pit is universal, cleaning of which is done at very remote intervals. Much worse than this is the leaching cesspool, which seems to be the common method of disposing of house slops. The house drain leading to it is moreover usually made of open jointed tile, which permits the escape of its contents along its course and doubtless often very near the house. Existing on every house lot, the contamination of the soil and ultimately of the wells and the air of cellars under houses from these sources is made very probable. I also found in two houses that the waste-pipe from the kitchen sink to the drain had no trap to cut off the foul air.

My attention was called to a large barn-yard in the center of the village, which from its low surface allowed the accumulation of water, and being in an uncleanly condition, should doubtless be included among the unsanitary factors of the village. As to the schools, concerning which inquiry is always made when diphtheria is present, there are two and both seem to be in good condition. The question was raised regarding certain cisterns at various points on the streets for accumulating water, to be used only in case of fire, as to their possibly contributing to the continuance of the disease ; but I do not think that they possibly could do so.

This history of the epidemic and these sanitary conditions of the village I learned by inquiry and personal inspection. To what is the rise and continuance of the epidemic due, and how can it be checked?

The disease appears in a previously healthy locality; cases occur at various intervals but mostly in the fall and early winter; they are found in all parts of the village and also in the country around; the sanitary conditions are generally bad, though no worse probably than they have always been, nor worse than are found in many, or perhaps most other villages. Here are facts very interesting and instructive to the student of this disease.

The origin of the disease is unusually free from obscurity; it is clear that it was imported. Having found a foothold in the community we are quite sure that its continued existence is due to one or both of two things; failure to properly destroy the disease germs, and the presence of filth accumulations in which we know these germs grow most actively and even perhaps may develop *de novo*. I think both of these have had a part in the continued existence of the disease here.

Destruction of the disease germs emanating from one sick with the disease is to be accomplished by quarantine, disinfection and fumigation of the house and premises infected by him. While these have been done they have not been done completely enough. I believe the necessity of thoroughness in this direction is being enforced more and more upon us, and that the control of a disease which caused one-fourth of the deaths from zymotic diseases in this State during the first six months of this year can not be effected without a quarantine, disinfection and subsequent fumigation so rigid as to destroy all seeds of the disease given off by the patient. The simplest article of clothing which may chance to escape this will hold these long-lived disease germs for weeks or months, and may be the carrier of them to some susceptible person. Quarantine should exclude all children of an affected family from the day and Sunday schools. Very explicit directions as to the methods of controlling and destroying the disease germs have been given to the village board of health, a copy of which I append, and if they are scrupulously carried out, I have no doubt that the main thing will be done toward cutting short the continuance of the epidemic.

But the germs of disease that are already abroad and beyond reach will, if such there be, cause the outbreak of further cases. These can only be reached now by removal as thoroughly as possible of the filth accumulations in which they develop. In the case of Nassau, I think the leaching cess-pools and leaching drains in this porous soil are the most important unsanitary things. The large quantity of liquid house-waste deposited in one spot, in time causes the formation of underground channels through which it flows, with the probability of reaching either the adjacent well or cellar. It would be better if slops were accumulated in a large vessel and from time to time distributed here and there upon the surface of the garden or grass plat; or better, the house drain should terminate in branching agricultural tile laid just below the reach of frost, as suggested by Waring, and under the garden or grass plat where the growing vegetation may absorb it. The privy pits should be cleaned out and replaced by water-tight receptacles or some form of earth closet. The barn-yard which I have referred to should be cleaned and filled to the grade of the surface about it; the negligence which might be harmless in an isolated country farm-yard would not be permissible in the closely inhabited village. Accumulations of decomposing animal matter ought not to be allowed in any case and especially where diphtheria has secured a footing. Deep drainage of house lots should be done wherever water accumulates in cellars. This sanitary work is especially called for on those premises where diphtheria has existed, as in them its germs are most likely to remain.

We learn that common sanitary laws may fail of observance for a long time, as in the present instance, without apparent ill result; but their non-observance supplies a soil for sustaining an imported zymotic disease, which thrives in such conditions. This is a lesson of which Nassau furnishes an illustration. Careful attention to them, which it ought not to be difficult to carry out among people of intelligence and prosperity, together with the natural healthful surroundings of this village, will rid it of diphtheria and make it in all respects salubrious, I have no doubt.

QUARANTINE OF DIPHTHERIA.

The following explicit directions were written out and sent to the Nassau board of health:

Remove the sick to an airy upper room if possible, and allow only the nurses and physician entrance to it, children being strictly excluded, also cats and dogs. This room should be stripped of carpet, hanging clothing, bureaus or chests of drawers and other unnecessary things, or such as would be injured by fumigation. Allow the windows to be open, the poison does not go far away; give sunshine and pure air constantly. All communication with the rest of the family should be restricted, and attendants on the sick should remember that they carry with them from the sick room the poison of the disease and they should keep entirely away from others, especially children, who take the disease most readily. Well children had better be removed from the house, but should be kept under observation and if diphtheria develops, brought home again so as not to establish a new nidus.

All persons remaining in any part of the house should not go to school, church or any general gathering, nor to any house where there are young persons.

Utensils used by the sick should be well cleansed before use by others. Food left by them should be destroyed.

All discharges from the mouth and nose must be received on cloths, which are to be burned, or in cups which can be disinfected. Also, the discharges from the kidneys and bowels should be first disinfected by one of the following disinfectants, preferably No. 1 or No. 4, and then buried 200 feet from any house or well, and not thrown into a privy vault.

DISINFECTANTS.

(1.) Sulphate of iron, three pounds to the gallon of warm water. (2.) Corrosive sublimate, one drachm, water one gallon. (3.) Sulphate of zinc four ounces, salt two ounces, water one gallon. (4.) Corrosive sublimate, one-fourth pound; sulphate of copper, one pound; water, one gallon; one-half a pint of this solution to a gallon of water for disinfecting excreta, and half this strength for washing wood-work and furniture. (Caution should be given as to the poisonous character of No. 2 and No. 4, if they are used.)

Bed and body clothing should be put in disinfectant solution 2 or 3 and subsequently taken from the room and boiled and washed apart from the family wash.

On recovery the patient and nurses should cleanse their bodies well, not failing to cleanse the hair carefully, putting on entirely fresh clothing and leaving all else behind them in the room to be fumigated. The convalescent should avoid all contact with the public as long as there remains any redness of the fauces, which will probably be not less than a month. If death results the body should be wrapped in a sheet wet with disinfectant (2), put in a tight coffin not to be subsequently opened and soon buried, the funeral being private, no children being allowed to be present.

After recovery or death the room must be disinfected and purified as elsewhere directed; the entire house to a less degree and the premises generally cleaned up.

CHLORINE DISINFECTION.

Mix well, breaking up all lumps, one part by measure of black oxide of manganese with two parts of common salt. Add then enough water to make of the consistency of cream (4 ounces to each pound of the mixture).

Then, having the rooms prepared by stopping all windows, chimney openings or other outlets, hanging bed-clothing or other fabrics so that they may be reached by the gas, and opening drawers or cupboards that may be in the room, arrange in each room one or more large earthen vessels, such as a wash-bowl, and pour into each about a teacupful of the mixture. All being ready, begin with the most remote room and pour, from a pitcher, a little less than an equal bulk of commercial sulphuric acid on the mixture in each bowl, and retire quickly, closing the doors. Avoid inhaling the fumes; a damp handkerchief held before the face will help in this.

Keep the rooms tightly closed for 12 hours, then air them thoroughly for two or three days.

Carpets, mattresses and woolens may after fumigation be exposed for several days to the outer air, and well beaten; if soiled by discharges, and of little value, they should be burned; otherwise they should be cleansed by boiling and disinfectants. Wash all wood-work, especially tops of doors and windows, with hot soap suds made with yellow laundry soap. It is well to wash the walls with the same, and to all may be subsequently applied a solution of 8 ounces of sulphate of zinc and 1 ounce of carbolic acid to the gallon of water; or solution No. 4 may be used, in which case the surfaces should be rinsed free from soap. Wall-paper should be removed.

The premises of the infected locality ought also to be cleaned up, and put into a sanitary condition, as the germs of most infectious diseases flourish in accumulations of filth.

If fumigation is done by means of the fumes of burning sulphur instead of by generating chlorine gas, not less than 2 pounds of sulphur should be burned for each 1,000 cubic feet, and it should be burned in iron pans supported on bricks placed in wash-tubs containing a little water.

Truly yours.

F. C. CURTIS.

APPROVED.— The importance of strict quarantine and careful disinfection can not be over-estimated, and the attention of the board of health of Nassau is particularly called to the portion of the report treating of preventive measures.

LEWIS BALCH,
Secretary.

WATER SUPPLIES.

REPORT

OF THE

Sanitary Examination of Various Proposed Public Water Supplies for the City of Syracuse.

By JAMES T. GARDINER.

LEWIS BALCH, M. D., *Secretary State Board of Health :*

SIR.—On the tenth of July last a communication was received from the common council of the city of Syracuse requesting the State Board of Health to make a sanitary examination of the several proposed water supplies for the city, selecting, however, for examination only those that are deemed practicable from an engineering and financial stand-point. The city made an appropriation to defray all expenses, and the board having agreed to undertake the work, I was appointed to make the examinations and report.

Heavy rains in the middle of July caused conditions unfavorable for water inspections, so that the first field work was not done until July twenty-first. The examinations were continued at intervals from that time until October. I investigated the water-sheds and bodies of water at such points as were necessary, and gave hearings to the parties interested in the three principal proposed water supplies, in order that each party might present all the facts and views that they desired. The last hearing was given on January ninteenth to the Central City Water Works Company.

During the course of my experience as director of the State survey of New York, I had already become familiar with the topography and geology, and in general with the hydrography of the region about Syracuse, but the sanitary facts observed in these recent examinations of the waters and water-sheds have many of them required most careful consideration before a satisfactory result could be reached as to the relative merits of these waters for the supply of the city.

The conclusions given in this report have only been arrived at after a most earnest attempt to view the subject from every side, bringing to bear upon it the light of the most recent investigations in Europe and in this country.

SANITARY STANDARDS FOR PUBLIC WATER SUPPLIES.

It must be remembered at the outset, that there is as yet no practicable method of testing absolutely and determining definitely the sanitary qualities of any waters. In former years, when it was supposed that in the absence of poisonous minerals or excessive amounts of mineral matter, an approximate determination of the amount of putrescible organic matter was mainly what it was necessary to know in deciding the wholesomeness of a water; and when fixed chemical standards were relied upon, waters having more organic matter than the standard being condemned as bad, and those having less being accepted as good; in those days, the work of the sanitarian was comparatively simple; but since modern science has shown that the *quantity* of putrescible nitrogenous matter in water is not the most important thing, but that the *character* of this matter is the vital point; and since no practicable method has yet been developed of determining either by chemistry or the microscope, the pathogenic character of the matter contained in large bodies of water, owing to the minuteness of the quantity which may be harmful, and its extreme diffusion, we are as yet generally left to deal with indications and probabilities in forming conclusions as to large bodies of water like lakes and important streams. In certain wells that have occasioned typhoid fever recently the specific organism causing the disease has actually been discovered by culture experiments and the microscope. The difficulty of detecting the typhoid germ is, however, so great, owing to its form being like that of many other bacteria, and the number of typhoid germs is so small compared with the volume of water and with the multitude of other bacteria usually present, that the isolation and determination of the existence of this microbe in large bodies of water, by culture investigations and the microscope, has thus far proved practically impossible on account of the many tests required, before a cautious investigator would dare to pronounce large volumes of water free from pathogenic microbes.

Some of the worst forms of diseases may be widespread through a community by means of the water supply, as was noticeably the case in Plymouth, Penn., and yet both chemical and biological analysis may utterly fail to discover in the water the matter which carries the deadly seeds of epidemic. One of the public water supplies of

Plymouth contained a much greater amount of organic matter than the other, but it was the water chemically purest which carried disease and death.

The entire failure of chemistry to find by analysis the disease bearing matter in water, and the series of recent discoveries which have placed it beyond doubt, that the cause of zymotic disease from waters exists in minute vital germs, or living plants, having enormous powers of rapid reproduction when placed under favorable conditions, have led to the belief that biological examination, by which the number of microbes in waters could be approximately determined, would prove a reliable method of ascertaining the wholesomeness of any given water.

The celebrated Dr. Koch and other experts in bacterial investigation elaborated methods for this so-called biological analysis of water, which have been tested in a variety of ways during the past two years, especially in Berlin and London.

The result of these attempts to apply biological analysis has been to show that the number of bacteria in water vary greatly with changes of temperature, or other conditions of storage, which may not at all affect the wholesomeness of the water, and that the wholesomeness of waters, or of any given water, does not *necessarily* vary with the quantity of bacteria or spores, *provided no pathogenic germs are present.* If, however, there are disease-producing microbes in a water, any condition or change which occasions an increase in the *total number* of bacteria or spores, doubtless multiplies the pathogenic germs present, and thus increases the danger. *So that waters liable to be contaminated are more dangerous when they contain a large total number of bacteria.* The greater part of the bacteria in any water are of course harmless. A few disease-producing germs are of more importance than thousands of these ordinary bacteria. A water supply commonly free from the specific germs of disease, but having conditions favorable to their development, may, when exposed to contamination, be suddenly invaded by pathogenic bacteria, and an epidemic produced.

Briefly stated, the present condition of knowledge on the subject is this :

Modern sanitary investigation leads to the conclusion, that when zymotic disease is produced by a public water supply, it is probably due to the existence in the water of a specific pathogenic germ, which has been introduced into that water from some source of contamination, and which possibly finds in the water conditions favoring its rapid propagation. These microbes, reaching the intestines of persons whose systems are susceptible, multiply with amazing rapidity, when the conditions are favorable, and cause disease. Among the myriads of germs contained in waters of larger volume, supposed to have been the source of epidemics, it has as yet proved impossible to discover the microbe which has produced the disease. Its existence in the water has only been inferred from its effects, and from the fact that the probable source has been found from which the pathogenic germ may have been introduced into the water.

The modern sanitary investigator for the present failing, on account of its infinitesimal amount, to detect in large volumes of potable waters the matter which actually causes disease, necessarily turns his attention to careful examination of the sources from which disease germs may invade potable waters, and his efforts are directed towards the protection of such waters from all kinds of pollution, and from the conditions which favor the development of microbes.

With most waters that are proposed for public supplies, there being yet no practicable means of saying *definitely* whether they do or do not contain the germs of zymotic disease, all that can be determined with regard to them is, first, whether or not they are so situated with regard to sources of contamination that disease germs are likely to enter the waters; and second, whether the waters exist under those conditions which are favorable to the rapid development or possible multiplication of such pathogenic bacteria as may find their way into them. All waters are, of course, more or less liable to the entrance of disease-producing organisms, and all waters, in some degree, have conditions more or less favorable to the growth of microbes. The question of the sanitary purity of water is, therefore, a relative one. No waters are absolutely free from danger; but some are far more liable than others to be the carriers of disease.

Since, therefore, the question of the purity of water is a relative one, it is necessary in choosing a water supply for a city to select those sources which from an engineering and financial stand-point are practicable, and then to determine by investigation and comparison, which of these proposed supplies is most liable to be impregnated with disease germs; and which water, when so impregnated, is likely to furnish most favorable conditions for the development and possible rapid multiplication of micro-organisms.

So far as chemistry, biology, meteorology and geology throw light upon these questions, they are of great value in ascertaining the probable wholesomeness of a water supply.

Other things being equal, *that water supply is the best, from a sanitary point of view, which is least liable to contamination; that is to say, to the* *introduction of disease germs; and which is least likely to favor the development and possible rapid reproduction of microbes.* While these are the two vital questions in comparing several proposed water supplies, it is of course essential that the supplies be sufficient in amount, palatable, and free from mineral constituents, objectionable either as to character or quantity.

The most virulent pathogenic microbes which endanger water supplies come usually from solid and liquid human excreta, particles of skin and tissue, and from the waste products and putrefaction of other animals; but disease-producing organisms, less deadly perhaps, yet far more common in many districts, probably have their habitat in swamps and saturated spots, where an excessive amount of vegetable matter is decaying in high temperatures.

The conditions which favor the development of microbes in natural waters are quality and quantity of food, the presence of oxygen, and elevated temperatures. When chemical analysis shows a water to contain excessive quantity of putrescible nitrogenous matter, according to accepted chemical standards, such water is objectionable on the ground that this matter may, in putrefying, afford the pabulum essential to bacterial development; and that mere increase of *quantity* of available food for these organisms aggravates danger, when contamination with pathogenic germs is possible. This is independent of the consideration that excess of organic matter shown by chemical analysis, often indicates and leads to the detection of sources of pollution of potable waters. The decay of higher organisms furnishes food peculiarly adapted to bacteria, so that in the presence of putrefaction, *spores are often found in great numbers, even when the general body of the water does not appear impure by chemical tests.* For this reason, the occurrence in a stream or body of still water of limited localities, where quantities of organic matter accumulate and putrefy, may create hot-beds for the propagation of bacteria, whose myriads of spores may be diffused through great volumes of water of high *chemical* purity, possibly contaminating the whole mass. The general body of water may not contain sufficient food, or be of proper temperature, to cause the development of the spores or seeds, but if there are a sufficient number of pathogenic germs among them, they will develop and become active agents of disease, when drunk by susceptible persons.

The examination of the proposed water supplies for Syracuse was shaped by these general principles, and an effort has been made to observe all important facts which might bear upon them.

DESCRIPTION OF WATER-SHEDS.

To the south of Syracuse lie the elevated regions of central New York, the higher points being some 1,700 feet above the sea. The drainage is through deep valleys running to the north. At the base of the hills lie many beds of limestone, and on these rest heavy masses of shale belonging to the Hamilton group. Fifteen to 20 miles from the city the tops of the ridges contain the Tully limestone, a bed of from 15 to 16 feet thick, which lies at the bottom of the Portage group. These rocks all dip to the southward, with an inclination of some 26 feet to the mile. The surface deposits in the valleys, and on their slopes, consist largely of glacial material, clays, sands, gravel and boulders brought from districts to the north of where they now lie. A very large proportion of the boulders and even larger gravel are of limestone, carried from the outcrops of the beds near Syracuse, and to the southward.

There are many springs in this hilly region south of Syracuse, some of them of very large size, but the waters are all more or less hard, as are the waters of the natural lakes, which occupy a number of the north and south valleys of the hill region in central New York. The carbonates and sulphates of lime and magnesia, which cause the hardness of the waters of this belt through central New York, come both from the beds of limestone, from the boulders and finely ground material transported by the glaciers and covering the surface to the south of the great limestone belt, and from the Hamilton shales. These shales contain in central New York such a large quantity of lime as to materially effect the waters which percolate through them, or which run over their surface.

The region above described is separated from the hill regions of the north by a broad and deep valley, forming the western extension of the Mohawk valley, reaching from Rome to Syracuse, and with the Mohawk, forming that great east and west depression or pass in the highlands of New York, through which the tide of emigration has passed westward by canal and railroad, and which is to-day one of the most remarkable channels of commerce in the world.

North-east of Syracuse, the lower part of this valley is occupied by Oneida lake, which is some 20 miles long by 4 miles broad. The axis of the lake is approximately east and west. It lies rather at the north side of the great valley. South of it is a strip of low flat land from 6 to 8 miles broad, stretching to the foot of the hills on the south. East of the lake the valley extends away, broad and flat, with hardly a perceptible rise to the city of Rome, where without noticeable change the divide of the waters occurs, and the descent is to the east along the

Mohawk, the head-waters of which come down from the highlands on the north. The great valley between Rome and the east end of Oneida lake is drained by Wood creek, which empties into the lake at its eastern end. The highlands to the north of Oneida lake and the great valley differ essentially from those to the south, both in topographical and geological characteristics. The rise to the north is comparatively gentle. The valleys are seldom deeply cut, and the region is one of plateaus rather than of abrupt ridges. For many miles to the north the rocks are sandstone. The soil contains comparatively little lime, and the limestone boulders are rarely seen. In the higher parts, the soil is so poor that great areas are still covered with the primitive forest. All attempts at farming have proved so unprofitable as not to encourage the clearing of the land. The streams from the western parts of this wooded region run either to Oneida lake, or west to Lake Ontario. Fish creek, which drains a part of it, is a large stream discharging into Oneida lake at the east end, while some 200 square miles drain through Salmon river into Lake Ontario.

The waters are extremely soft, coming as they do from a water-shed, of which both the soils and the rocks contain very little lime, or magnesia carbonates or sulphates. Oneida lake, receiving the drainage of the soft-water highlands on the north and the harder waters of the southern highlands, is neither a very hard nor a very soft water, but stands between the two extremes.

It is possible to obtain a sufficient supply of water for Syracuse either from the hilly region to the south of the great valley, from Oneida lake, or from the hill region to the north. The present public supply is from the south. It consists of the flow of certain large springs in the hills some four miles south-west of Syracuse, supplemented by the waters of Onondaga creek, which are pumped into the same reservoir that receives the spring water. A small amount is also received from a reservoir on Onondaga hill. At times the discharge of the springs has been so great that little or no water was pumped from the creek, while at other times when the consumption has increased, it appears that about one-half the water used has been from the creek, and about half from the springs.

This supply is objected to on the ground of its hardness, and on sanitary grounds, because of the danger from contamination of the waters of Onondaga creek, pumped as they are from a point just south of the city limits, and exposed to the polluting influences of a comparatively thickly settled region for some miles above. These defects in the present supply are generally recognized, both by the company supplying the water, and by the people.

The agitation for improvement, during the last 3 years, has brought about the discussion of various other sources of water supply. Among those lying on the southern hills public attention was turned strongly to the natural lakes which lie nearest to Syracuse. These are Skaneateles and Cazenovia.

The Tully ponds or lakes, which lie some 18 miles to the south, had been carefully investigated and reported upon as a water supply in 1870 and 1871; so that the possible yield of water from that source had been more or less discussed for a long time; but in view of the growth of the city, the general conclusion had been reached, that the Tully lakes would not furnish a sufficient amount of water for the permanent needs of the city.

Cazenovia lake proved open to the same objection, the supply being clearly insufficient for the uses of the city; besides which, it is a reservoir for the Erie canal, and legally a part of the canal, and therefore, the water could not be diverted for the use of Syracuse.

A large number of citizens were strongly in favor of Skaneateles lake, but this also, under the decision of the Attorney-General, is a part of the Erie canal, and without a change in the Constitution of the State, the water from it could not be diverted for city use. To obtain the water from Skaneateles lake is therefore legally impracticable. For this reason no detailed investigation was made of it, from a sanitary point of view; but the analysis which has already been made of this water shows that while it is chemically pure, as respects the amount of organic matter contained, it is not a soft water, but like the other lakes in this formation, it lies in the middle region between hardness and softness, though the water is not hard enough to be seriously objectionable either for washing or for steam purposes. While the waters of the lake are quite pure, as regards amount of putrescible organic matter, it is still increasingly liable to specific contamination, from the summer residences which are being built along its shores, and from the well-known resort at the head of the lake. If Skaneateles lake should be used as a water supply, special means would have to be taken to prevent possible contamination from human sources. The following analysis of the water is given in the report of the city chemist, Dr. T. E. Englehart, to the city board of health:

ANALYSIS OF WATER OF SKANEATELES LAKE, TAKEN NEAR ITS OUTLET.

Total solids evaporated at 212 Fahr. (grains per U. S. gallon)	6.779
Chlorine	trace.
Per million parts.	
Free ammonia	.003
Albuminoid ammonia	.006

In the report of Mr. J. J. R. Croes, made in January, 1871, on page 3, in table No. 3, he quotes an analysis of the water of Skaneateles lake, made in 1865 by Prof. C. E. Chandler, in which the grains of impurity per gallon are given at 23.85.

Near the head of the lake Dr. Englehart reports that the total solids were 8.747 per gallon.

In the report of Mr. Howard Soule to the Syracuse Water Company, in September, 1885, the hardness of Skaneateles lake is given as 10 degrees, but it is not stated by whom the test was made, or what scale of hardness is referred to.

No analysis of the waters of Skaneateles lake were, as I have said, made in this examination, as it is not considered one of the practicable supplies for the city of Syracuse.

In general it may be said, that all the lakes and larger streams in the hill country south of Syracuse, excepting Onondaga creek and the Tully lakes, have been taken by the State as feeders or reservoirs for the canal, and they are therefore not available as water supplies.

The only practicable supply from this region for the city of Syracuse, is that proposed by the Syracuse Water Company, which is now supplying water to the city. Their plan is to build a dam across a narrow point in the upper valley of Onondaga creek, the dam being 200 feet long by 90 feet high, which shall set back the water some 4½ miles, flooding Cardiff valley, and thus creating an artificial lake about 4½ miles long by five-eighths of a mile broad, covering some 1,600 acres of land. This lake would be supplied with water from the springs at the head of Onondaga creek by three smaller creeks and by the flow of rain-water from the water-shed, reported by the engineer of the company to be about 40 square miles. By means of an iron conduit the water would be carried by gravity a distance of about 8 miles to the present distributing reservoir, and directly to the city mains.

This Cardiff reservoir scheme being considered the only practicable supply from the region south of Syracuse, was carefully investigated, and will be discussed in detail hereafter.

The next plan brought before the citizens of Syracuse was the Oneida lake supply, which was proposed to be brought in by the Central City Water Works Company. This plan contemplates the pumping of water from Oneida lake up to the city of Syracuse, the water to be drawn from the lake at Shackleton's Point, several thousand feet from the shore, and pumped a distance of some 14 miles to the city, the surface of the lake being about 30 feet below the surface of the canal at Syracuse.

This Oneida lake supply, being considered practicable from an engineering and financial stand-point, was carefully investigated.

The third and last plan proposed for the city supply is that of Salmon river.

This stream heads on the higher part of the plateau and hill region lying north of Oneida lake, whence it flows into Lake Ontario near Pulaski. The hilly plateau included between the main branches of the stream is from 1,000 to 1,500 feet above the sea, and so thickly covered with forest as to have borne the name of the "Little Wilderness." Two main streams, the north and east branch, unite at Redfield, a little town about 550 feet above the canal at Syracuse, and distant from the city about 40 miles in a straight line. For some 5 miles below Redfield the valley of Salmon river has scarcely any fall and is broad and flat. It has been proposed to build a dam across the valley 5 miles below Redfield, of sufficient height to make a reservoir or artificial lake about 6 miles long and from one-half to 1 mile broad, and later to dam only the east branch and to bring water from the reservoir, by an iron conduit, some 40 miles to the city of Syracuse. The plan being a practicable one was carefully investigated.

After viewing all of the original propositions for the supply of Syracuse, it appears that many of them must be dismissed either for engineering or legal reasons, or on account of manifest insufficiency in the quantity of water, and that only three of the new plans can be considered practicable:

1. The Cardiff Valley Reservoir.
2. The Oneida Lake Supply.
3. The Salmon River Supply.

The detailed examination was therefore confined to these, and to the present supply furnished by the Syracuse Water Company.

THE SALMON RIVER SUPPLY.

On the twenty-first of July I reached Syracuse and went northward to the Salmon river water-shed. Before leaving the city I made the following experiment, as a test of the Salmon river water, believing that any city supply should of course be palatable.

Dr. Albert Mercer some 3 weeks before had visited Salmon river, and brought back a quart bottle of the water of the stream. This had stood upon his mantlepiece, exposed to ordinary summer temperatures, and to light, the bottle being well corked. The color of the water was a very light yellow brown, and very little sediment was upon the bottom of the bottle, so little as not to interfere with the pure appearance of the water when the bottle was shaken. After shaking the bottle, some of the water was poured into a glass, while into another glass was put cistern water, filtered through animal charcoal, the water being from Dr. Mercer's cistern, which had been cleaned within 6 months. The object of the experiment was to compare the Salmon river water in taste to the best soft-water that could be obtained. Both glasses were given to Dr. Mercer to taste, he being blindfolded so as not to form any opinion from the color of the water, as to its source. He was asked to decide which water was more palatable. The experiment was repeated a number of times, with the result that the Salmon river water was declared decidedly the better.

The same experiments were again made with another physician, who was in the office at the time, with the same result as before, that the Salmon river water was declared the better.

Dr. Mercer then tried the same experiment with me, under the same conditions, my eyes being blindfolded. The result was, as with the two physicians, that I selected without knowing it the Salmon river water as being the most palatable.

The filtered cistern water used for comparison was certainly an excellent soft-water, and is such as is used by Dr. Mercer for drinking water for his family. The Salmon river water, it will be remembered, had been kept for three weeks in a bottle at ordinary July temperature.

On the afternoon of July twenty-first, I reached the Salmon river water-shed, and in company with Mr. H. D. L. Sweet, began the sanitary investigation of the district.

In discussing the water-shed of the Salmon river, I shall of course speak only of that part above the dam of the lowest proposed reservoir—this dam being near Stillwater bridge, about 5 miles below Redfield.

The region is really a high plateau, rising towards the north with the rise of the underlying strata, which consist of hard sandstones of the Hudson river group. The elevations are from 1,000 to 1,500 feet above the sea, and the valleys of the branches of the river are not deeply cut.

There are 2 main branches to Salmon river, which unite at Redfield, the waters of which will be received into the lower proposed reservoir. These are the east branch and the north branch. The streamlets, which are tributary to these branches, head in the elevated area included between the forks of the river. The marked topographical characteristic is, that the courses of the streamlets, which form what might be called the head-waters, are in very shallow depressions in the top of the plateau. The regions drained by the north branch have thin soil covering a very impermeable hard-pan. It is probable that a large part of the water stored in the soil of the water-shed of the north branch of Salmon river, is held quite near the surface in the soil of the shallow depressions about the heads of the streams. The water-shed of the two forks is at least 180 square miles. I estimated from my observations that from 80 to 85 per cent of the water-shed tributary to the reservoir is wooded. The forests consist largely of hard-wood timber, the timber available for lumbering and for bark having been mostly cut out. Many of the farms formerly cultivated have been allowed to return to woods, and the greater part of the region is primeval forest. The elevation of the Salmon river water-shed and its forest covered character tend to keep it both cool and moist, and the character of the geology is such as to favor the purity of the water as respects mineral constituents.

The topographical features are not, however, so favorable. The flatness and shallowness of the valleys, in which the streamlets head, give them sometimes in places a swampy character, even when they are not well marked swamps. In some cases the streams within the first few miles of their sources pass through clearly defined swamps or have swampy borders. This is due to the comparatively slight fall in the valleys near their heads. Where there are swamps on the north branch of the Salmon river, they are merely narrow strips near the head of the streams. Sometimes the swamps are the result of beaver dams. I especially mention that there are swamps on the head of some of the brooks, because their existence has been both affirmed and denied; but there appears to be no doubt, that there is quite a long swampy meadow on the head of Mad river, above Hooker's mill, and that there are also 2 swamps on the branches of the north fork proper. It does not appear, however, that the streams head in these swamps, but that they head in springs, and then run down through the swamps in the first few miles of their course. After the streamlets reach the main branch, the descent is too rapid to permit of the existence of any swamps, the fall being at the rate of some 25 feet to the mile along the Mad river. The beds of all the principal streams are of sandstone, pebbles or boulders, and both the beds and the shores show remarkable absence of vegetation down to the very location of the lower proposed dam.

This absence of aquatic vegetation is quite noticeable throughout the 5 miles of meadow-like valley, through which the stream runs from Redfield down to Stillwater bridge.

The water of Salmon river has, however, a very marked peaty brown color where it is shallow, which deepens to a mahogany tinge where the water is some 4 feet deep. Even in many of the smaller streams this mahogany color or red is distinctly noticeable. It is this color which has given the impression that the waters of Salmon river came largely from the swamps; and in fact has given rise to the impression, in some quarters, that the water contains a large amount of organic matter. There is a very marked difference of color in the waters, both of the little brooks which flow into the main streams, and in that of the main streams themselves, the water of the north fork at Redfield being very much deeper in color than the water of the east branch.

To determine whether these differences in color represented marked differences in the amount of organic matter in the different streams, I took a series of samples of water for analysis from the different main streams, and from smaller brooks near their head-waters. I also endeavored to determine the source of the coloring matter.

It was evident from an examination of the water-shed, that the amount of swamp was very small, either as compared to the whole water-shed, or with the length of the streams; or in other words that a very little of the swamp colored the water in certain cases quite deeply, the color being characteristically different from that of ordinary peaty swamps. In no part of the State, south of this region, are the waters as red. It has been proposed as an explanation of this redness of the water, that it came from the rocks and underlying soil, but this is not a fact. The springs throughout the Salmon river water-shed are colorless, and the water of some of the brooks are nearly colorless; while in the immediate neighborhood other brooks are strongly tinged with mahogany red. It was clearly evident, therefore, that the coloring matter is taken from some vegetable source, and, that this source is not the ordinary decomposing bark and wood, which is found clogging the course of all the forest streams. In a close examination of some of the very small streamlets, I found growing in them algæ of a deep mahogany red color, of exactly the same tint as that found in the water. In some swamps there were pools where this algæ grew so luxuriantly as to give a rich deep mahogany hue where the water was hardly six inches deep.

Feeling that this question was a most important one from a sanitary point of view, I spent several days in a careful examination of the head-waters of the Salmon river, and I am convinced that the peculiar red brown color of the water, is due neither to the underlying rocks nor to the soil, nor to a great extent of the swamp land; but, to the unusually powerful coloring matter contained in certain algæ, which grow in both temporary and permanent swamps, and in pools and brooklets, formed in excessively wet weather when the temperature is high. In certain places, I found these red algæ growing in the streamlets where there was no swamp; but in these cases the streamlets were of a temperature noticeably high and were evidently temporary, there having been heavy rains for four or five days previous to my visit. Near the road side on the north fork were two streamlets three or four inches wide by an inch deep, which joined one another. Above the junction, in one of them, the little brook channel was covered with a rich growth of the red algæ. In the other streamlet below the junction no algæ grew. The temperature of the colorless branch was 55 degrees, and of the water in which algæ grew 70 degrees. At another point I found the red algæ growing in a brooklet the temperature of which was 75 degrees.

It appears therefore that under proper conditions of temperature, these algæ may grow even in running water, and when they decay, impart to it the mahogany red tinge, which is so noticeable a characteristic of the Salmon river waters.

In taking samples for chemical analysis carefully cleansed gallon demijohns were filled with water from the streams having the deepest color, and from those having almost no color. The clearest water showed the least amount of organic matter, while the most deeply colored water showed the greatest amount of organic matter; but even in the case of the deepest colored water, the organic matter is by no means unusual in quantity for a forest stream.

Just above Redfield, where the north branch joins the east branch, there is a marked difference in the waters; the water from the east branch being very slightly colored, while that from the north branch is of a deep mahogany red. Although the east branch carried from 30 to 40 per cent of the water of the total stream below the junction, so pervading was the red hue of the north branch, that the whole stream from Redfield down seemed almost as red as the north branch.

My first samples were taken on the north branch, as this was evidently the one which would bring most organic matter to the reservoir. From two or three miles from Redfield, the north branch of the Salmon river is divided into two parts, one heading some miles above a hamlet called Greenborough, on the old State road, and the eastern and longer branch, called Mad river, heading up in the town of Montague in Lewis county, running thence westward into Jefferson county, and thence southward to Redfield. A sample of water was taken from the Greenborough branch, near the Greenborough tavern, at a point some four or five miles from the extreme head of the stream. On Mad river a sample was taken above Hooker's mill, the last mill on the stream, and possible eight or ten miles from the head-waters. A third sample was taken of an unusually clear brook which flows into Mad river in the north-west part of the town of Redfield, above Littlejohn's mill. The fourth sample was taken from the north branch just above Redfield, which may be considered a fair sample of the waters which the north branch will contribute to the reservoir, under conditions similar to those at the time of the examination. The table on the following page shows the results of the analyses made of these four samples by Dr. Willis G. Tucker, of Albany, N. Y., the samples having reached his laboratory the day after they were taken from the streams. The analyses were made with the water shaken up, and also after allowing it to settle for 48 hours. There is little difference in the results, and not enough to be of practical importance, the slight increase in free ammonia being doubtless due to the chemical changes in the water from storage.

Sample No. 1 fairly represents the Greenborough branch, above the last habitation. It was taken at 9.20 A. M., the temperature of the water being 58 degrees. The color of the water was light, the taste good, and but little vegetable sediment could be seen when the glass of water was held up to the light. As will be seen by the table, the amount of putrescible nitrogenous matter is not large, the albuminoid ammonia being only .0095, while the total solids were only 5 parts in a 100,000.

Sample No. 2 was taken at 2.20 P. M., above the bridge above Hooker's mill, on Mad river. It represents the condition of the water above all sources of human pollution. The temperature of the water was 66 degrees and of the air 64 degrees. The color was a deep red, and the water was clear and contained little sediment, and the taste was good. A hunter, whom I questioned as to the condition of the stream above this point, said that it passed for nearly four miles through a swampy beaver meadow. The water was redder than that of any of the upper branches of Salmon river which I saw. The analysis shows that it contains probably 40 per cent more of putrescible organic matter than the Greenborough branch, the free ammonia being .005 and the albuminoid ammonia being .0135 and the total solids 7.70.

These figures, while larger than those of any other stream that I sampled on the water-shed, do not show an excessive amount of organic matter for a woodland stream. Many of the streams of the Rocky mountains often showing in the albuminoid ammonia .02 to .03.

ANALYSES OF WATERS FROM NORTH BRANCH OF SALMON RIVER.

Received from J. T. GARDINER, *July* 23, 1886. (*Results, parts per* 100,000.)

Number.	DEMIJOHN NUMBER.	Color.	Odor.	Taste.	Cl.	Free H_3N.	Alb. H_3N.	Total solids.	Loss on ignition.	Mineral matter.
17..	No. 1—Shaken	Brownish yellow	None.	None.	0.15	Trace.	0.0095	5.00	3.00	2.00
18..	No. 1—Clear	Brownish yellow	None.	None.	0.15	0.0013	0.0090	4.80	3.00	1.80
19..	No. 2—Shaken	Brownish yellow, deeper than Nos. 1, 3 and 4	None.	None.	0.20	0.0053	0.0135	7.70	4.70	3.00
20..	No. 2—Clear	Brownish yellow, deeper than Nos. 1, 3 and 4	None.	None.	0.20	0.0080	0.0125	7.60	4.60	3.00
21..	No. 3—Shaken	Brownish yellow	None.	None.	0.20	Trace.	0.0070	5.40	3.20	2.20
22..	No. 3—Clear	Brownish yellow	None.	None.	0.20	0.0013	0.0060	5.40	3.20	2.20
23..	Fo. 4—Shaken	Brownish yellow	None.	None.	0.15	Trace.	0.0080	6.10	3.70	2.40
24..	No. 4—Clear	Brownish yellow	None.	None.	0.15	0.0010	0.0075	6.10	3.70	2.40

Some five or six miles below Hooker's mill was a clear colorless brook, about two feet broad, with a temperature of 57 degrees. This I sampled, and the results are given as sample No. 3 in the above table. The analysis shows a mere trace of free ammonia, and of albuminoid ammonia .007, the total solids being 5.40. This stream, like the others, is a forest stream, entirely free from all human or artificial pollution. It is the clearest brook that I saw tributary to the north branch, and contains probably some 30 per cent. less organic matter than the Greenborough branch.

Sample No. 4 was taken half a mile north of Redfield, and fairly shows the chemical condition of the waters of the north branch, including both Greenborough and Mad river forks. The temperature of the air was 52 degrees, and of the water 63 degrees. It was taken at 8 o'clock in the evening. From the point where the sample was taken at Hooker's mill down to Redfield, the stream must have run some 15 to 20 miles, the fall being about 900 feet. The analysis shows a mere trace of free ammonia, and of albuminoid ammonia .008, and the total solids are 6.10. It would appear, therefore, that by oxidation the stream has freed itself of a large percentage of the organic matter which it contains at Hooker's mill and at Greenborough. Even according to the most rigid chemical standards that have ever been proposed, this water must be pronounced as comparatively pure, so far as amount of putrescible nitrogenous matter is concerned. I see no reason to suppose that there were any conditions existing at the time of my visit, which would tend to produce any unusual impurity in the streams. From the above analyses, by comparing the analysis of sample No. 3, which was so light colored as to seem colorless in the brook, with sample No. 4, which is deeply colored water, it appears that this deep color does not necessarily represent a greatly increased amount of organic matter. The head-waters of the north branch undoubtedly contain more organic matter than the stream at Redfield. Oxidation in the long run over a stony bed has greatly purified the water, but it has done comparatively little to remove the *color* of the water, which at Redfield is full as deep in hue as would be due to the mingling of waters of various colors from Greenborough and Mad river tributaries.

On July 23, an examination was made of the east fork, some 6 miles above Redfield. At Osceola, a large branch called Fall brook enters the east branch. Fall brook has a slight color, and the main east branch above the junction is apparently colorless. From Fall brook down to the junction of the north branch at Redfield, the east branch has a slight color. I took a sample from the east branch, where it was clear and colorless, above the junction of Fall brook, and another one about half a mile above its junction with the north branch near Redfield, where the color is slightly yellow. The temperature of the water at the upper point was 53½ degrees, and at the lower 61 degrees. The temperature of the air was from 65 to 70 degrees. The following table shows the results of these two analyses. They were made by Professor S. A. Lattimore, the samples being received at his laboratory the day after they were taken from the stream:

ANALYSES OF WATER OF EAST BRANCH OF SALMON RIVER.

(*Parts per* 100,000 *by Weight.*)

Sample mark.	Color.	Odor at 100° F.	Chlorine.	Free ammonia.	Alb. ammonia.	Total solids.	Loss on ignition.	Mineral matter.
No. 1....	Clear...	None...	Trace.....	None...	Trace.....	6.00	2.80	3.20
No. 2....	Clear...	None...	Trace.....	None...	Trace.....	6.72	3.72	3.00

Sulphates, nitrates and nitrites — none.

Diatoms, desmids and infusoriæ — few.

This water of the east branch is thus shown to be remarkably pure, the amounts of free and albuminoid ammonia being too small to be detected by the process. It is impossible for me to say exactly what proportion of the stream below Redfield is supplied from the east branch, but I should estimate it as from 30 to 40 per cent at the time of my visit. The combined waters of the two branches which will enter the reservoir must therefore be classed as pure waters, considered as to the amount of putrescible nitrogenous matter which they contain. Other analyses have been made of Salmon river waters, for Mr. William A. Sweet, both by Professor Lattimore and Professor Tucker, which show even better results than those derived from my specimens. It is quite possible that the stream contained at the time of my visit more organic matter than usual, due to the fact that it was somewhat swollen by a week of unusually heavy rains, which ceased only three days before my arrival. This may account for the difference between the analysis of the samples taken by me and those taken for Mr. Sweet; but judging the water entirely from the samples taken by myself, the water of the east branch of the Salmon river must be considered of remarkable chemical purity, and that of the north branch as of excellent chemical purity for a forest stream.

It remains to be considered whether these waters are liable to be contaminated by the entrance of the germs of specific disease from human and animal sources; and whether they are liable, when impounded in a reservoir, to favor the growth of organisms which will render the water unfit for use.

As regards contamination from human sources, it can be said at the outset, that they are exposed to but few dangers. The facts that the greater part of the water-shed is covered with the native forest; that all attempts at farming have been such failures that many of the farms are abandoned and already overgrown with trees; that the valuable soft-wood growth has been removed, so far that hardly half a dozen saw-mills remain in the whole territory; that the tanneries have all been abandoned; all point to a remarkable freedom from human interference with the upper waters of Salmon river.

At Redfield there is a hamlet of some 20 houses, where there is a small burying-ground that would be near the edge of the reservoir. I find, however, that the reservoir can be absolutely protected from any danger from this source.

At Osceola, the only other hamlet on the water-shed, there are some 40 houses so situated as not in any wise to endanger the purity of the stream, if proper precautions are taken.

The saw-dust from the saw-mill at this point is not put into the creek.

In general, I may say that I know of no water-shed in the State, available for the public supply of a city, which can be so perfectly protected from contamination from human sources as that of the Salmon river.

As regards the danger to the water from being impounded in the reservoir, the question was more difficult. There is little fear of the reservoir being invaded by the specific germs of disease, but many impounded waters throughout the country have been liable at times to the growth of small water plants, and in some cases animals, having such a disagreeable odor and taste as to render the water extremely unpalatable, so much so indeed as to prevent its use, in some places, and indirectly cause disease, by driving people to return to polluted wells rather than to drink the water of the public supply.

There is a good deal of uncertainty as to the conditions which favor or produce these organisms, but in general it may be said, that they are most liable to occur where the waters are shallow and of a high temperature, and where the bottom and border of the reservoir have a soil adapted to the rapid growth of vegetation.

All the soil of the Salmon river region under discussion is, as I have said, of very poor quality. Even the valley below Redfield, which would form the reservoir, is no exception to this rule. If the organic mould, which forms the top-dressing of the soil, were removed, sand, gravel and poor clay would be found underneath.

In general my examination showed that it would be possible so to prepare the bottom and borders of this reservoir as not to favor the growth of vegetation. The same may be said of the proposed reservoir in the east branch. The marked absence of vegetation in the streams, even when they are sluggish, was at first difficult to account for; but a series of observations on the temperature of the waters of both branches of Salmon river, shows that they are so cold as to greatly retard vegetable growth.

At Stillwater bridge, on the afternoon of July 21st, the temperature of the air was from 78 to 80 degrees, the temperature of the water was 65 degrees. At Redfield, five miles further up the river, between 5 and 7 P. M., the temperature of the water was from 69 to 67 degrees. Some springs that ran into the river were found to have a temperature of 53 degrees. At 8 o'clock in the evening the river water had fallen to 60 degrees, and at 7 o'clock the next morning it was 55 degrees. The temperature of the Greenborough branch and its tributaries during the morning of July 22d, was from 58 to 61 degrees. At Littlejohn's mill on Mad river the temperature of the water at noon was 61 degrees, the temperature of the air during the middle of the day being 64 to 65 degrees. At Hooker's mill at 2:30 the temperature of the water was 66 degrees, but the usual temperature of the brooks between Littlejohn's and Hooker's was 57 degrees. At Redfield at eight o'clock the same evening, the temperature of the water was 63 degrees in the north branch. The next morning the temperature of the water in the east branch was 56 degrees. In Fall brook it was 58 degrees, and in the main stream above Osceola it was 53½ degrees, the temperature of the air being about 65 degrees. All these days were clear and bright. A climate which permits of such low temperatures of air and water in the latter part of July is certainly most favorable for the storage of water. There are evidently great changes in temperature between night and day — a condition also unfavorable to the development of organisms in water.

The only shallow water in the lower reservoir will be near its head where the cold waters from the two streams will enter.

I am therefore of the opinion that owing to the character of the soil of the proposed reservoir, and to the climatic conditions above described, it will be possible to impound the waters of Salmon river with only a remote risk of their being invaded either by noxious algæ or sponges liable to render the waters unpalatable.

As regards the hardness of the north branch, the analysis made by Prof. Lattimore for Mr. Sweet, gives the hardness at 2.64, and that of Prof. Tucker of the south branch, gives the hardness at 2.08, the scale of hardness representing parts of hardening matter per 100,000 parts of water.

Since the time of my visit to the Salmon river, the modification in the plan has been proposed which contemplates placing the reservoir above Redfield on the east branch of the river, instead of below Redfield, where the water of both branches would enter it. I have not had the data to determine from an engineering point of view, the characteristics and capacity of such a reservoir, but so far as sanitary conditions are concerned, the valley of the east branch is well adapted for a reservoir.

It has already been shown that the waters of the east branch are decidedly purer than those of the north branch, and are in fact beyond all question as to amount or character of organic matter contained in them. They are purer, colder and more colorless than the waters of north branch, and have the taste of the best spring waters.

It is also possible to protect them very perfectly from human sources of pollution. Whatever amount of danger there may be from pathogenic germs floating in the atmosphere, these are reduced to the minimum with reservoirs situated as this would be surrounded by sparsely populated and forest covered hills, remote from all sources by which the atmosphere is liable to be contaminated.

A reservoir, located on the east branch of the Salmon river, would be supplied with water so free from putrescible nitrogenous matter, that no measureable amount of free or albuminoid ammonia results from its analysis, and which in temperature and surrounding conditions, has least possible liability to be contaminated with harmful germs, or to favor the growth of any organism.

As to the quantity of water that will be supplied by the east branch during the driest portion of the season, I am not able to speak, as the gaugings, which I recommended, were not made; but, as the water-shed has an area of some 80 square miles, the total yearly flow will furnish ample supply for the city if it can be impounded in a reservoir of sufficient size.

ONEIDA LAKE.

Oneida lake, as has been previously said, occupies a part of the broad, flat valley, which forms the westward extension of that of the Mohawk river. The valley in this part is some 13 miles broad from north to south. The nearest point of the lake is 12 miles from the city of Syracuse, and some 30 feet below the level of the canal in the city. It is some 20 miles long, and for about four-fifths of its length has an average width of 4 miles. Its superficial area is approximately 80 square miles. Its drainage area is reported by the Central City Water Works Company to be about 1,800 square miles. The deeper parts of the lake average from 25 to 35 feet deep, although there are deeper localities, but a very large part has depths not exceeding 12 or 15 feet, while along the shores are bays much shallower. In general it is very shallow, as compared with the other lakes of central New York. It lies close to the foot of the hills on the north side of the valley. The New York Central railroad and Erie canal run along the foot of the hills on the south side of the valley. Between them and the lake is a strip of land from 6 to 10 miles broad, which in general, is very flat. Immediately along the shore of the lake, and perhaps for a mile or two back, the surface is a little elevated, forming what may be considered as a low flat ridge along the lake. But south of this ridge, between it and the railroad and the canal, is a belt of more or less swampy land, extending northerly the whole length of the lake, and parallel with it. While the eastern half of this swampy belt does not include a very large number of acres, the land along most of the water-courses is more or less saturated, giving to these streams a sluggish character, and causing the discharge into them of a large amount of water impregnated with organic matter. The western end of the swamp is known as the Cicero swamp, which is some 7 miles long by 2½ miles broad in the broader parts. Three large streams, whose branches drain the highlands to the south, enter Oneida lake on the southern side. The western is Chittenango creek, the middle one Canaseraga creek, and the eastern, Oneida creek, which enters the lake at its south-east corner. These creeks drain not only the highlands south of the railroad, but also the flat saturated lands between the railroad and the lake. On them are a number of villages, some of considerable size, and many smaller ones. The well-known villages of Fayetteville, Chittenango, Canastota and Oneida are on these streams, and from 6 to 7 miles from the lake. In the belt of land lying south and east of Oneida lake, and within 8 miles of its waters, there is probably a population of 20,000 people, in the villages, and hamlets situated on the branches of Oneida, Canaseraga and Chittenango and Wood creeks. One village, that of Bridgeport, is only 2 miles from the lake, on Chittenango creek.

At the east end of the lake it is entered by Fish creek, a large stream heading in the highlands some 40 miles to the northward. Just at its mouth Fish creek receives the waters of Wood's creek, which heads in the hills north of Rome, one branch of it coming through the city of Rome itself. Wood creek receives the drainage from a part of the city of Rome, and from the ditches which have been dug to drain the saturated lands lying south and south-west of that city. On one of its branches is the village of Verona, about 8 miles east of the lake, while Rome is some 13 miles from the east end of the lake.

Fish creek is almost a mountain stream in the rapidity of its flow, affording valuable water-powers, which are utilized at a number of places along its course.

Among the important and flourishing villages on its eastern branch are McConnellsville, Camden, West Camden and Williamstown, McConnellsville being some 12 miles from the lake, as the stream runs, Camden some 18 miles, and Williamstown perhaps 28 miles.

There are a number of wood-working mills at various points on these streams, from which both sawdust and shavings have been allowed to enter the creek. Just above the mouth of Fish creek on Oneida lake, there is a watering place called North Bay, situated on the shore of the lake, the principal attraction of which is the lake itself as a bathing place. About the middle of the north shore of the lake is the village of Cleveland, and 7 miles further west that of Constantia. Along the shore of the lake are shallow bays, some of which contain saw-dust and tan-bark deposits. Along the south shore of the lake the shores are very swampy near the eastern end. Owing to the extensive shallows which occur in the lake, both near its shores and in its center, its navigation is somewhat difficult. The disturbances occasioned by strong winds undoubtedly move the waters of the lake to the very bottom over the shallow parts. Well-defined surface currents are sometimes created by the winds. At least two-thirds of the area of the swampy lands, lying south of Oneida lake, are drained by the branches of the Chittenango creek, which enters the lake some 8 miles from its outlet at the western end. For this reason the Central City Water Works Company have proposed to take water from Shackleton's Point, some 3 miles east of the outlet of Chittenango creek, hoping thereby to escape the influence of these swampy waters upon their in-take. In time of flood, Chittenango creek brings down a a very large volume of water, which, as seen at Bridgeport near its mouth, is strongly discolored with vegetable matter from the overflow of the swamps. Both Chittenango, Canaseraga and Oneida creeks are feeders for the long level of the Erie canal which extends from Rome to Syracuse. Reservoirs are constructed on them above the canal, and the water is withdrawn from the stream channels to the canal. When the reservoirs are full, or when more water is being received into them than the canal requires, the surplus is discharged down the natural channels of the stream. This is in fact the condition which exists, except during some six weeks of the year, when the water is at its lowest stage. Besides this surplus water, these streams receive the overflow of the canal from a large number of spill-ways which occur both at the aqueducts and at suitable points between them. During all the year, except at the time of extreme low water, the State Engineer and Superintendent of Public Works report a very large amount of water as thus discharged from the Erie canal into the streams which flow into Oneida lake. Even in times of low water, a considerable loss of water occurs at the spill-ways and aqueducts. The leakage and overflow of the canal into these streams is estimated by the State Engineer and Surveyor at 400 gallons per minute per mile, or 576,000 gallons per day per mile. The flow from the canal into Oneida lake on this basis would average some 20,000,000 gallons per day. A branch of the Erie canal enters Oneida lake near its south-east corner, but this is practically disused, and almost no canal water reaches the lake through this channel.

On the 30th of July last I visited Shackleton's Point to inspect the locality and take specimens of the water for examination and analyses. At 12 o'clock at noon the temperature of the air was 76 degrees, and a fresh breeze was blowing from the west. About 1,000 feet from the shore, where the water was 30 feet deep, I took sample No. 1, from 20 feet below the surface of the lake. The temperature of the surface water was 77 degrees, and at 20 feet depth 73 degrees, Fahr. Two thousand feet from the shore the surface temperature was 77 degrees, and at 20 feet depth 73 degrees, Fahr. I here took sample No. 2 at 20 feet depth. At 33 feet depth (that is on the bottom) the temperature was 71 degrees, Fahr. In Mr. Shackleton's well, near the shore of the lake, the temperature of the water was 50 degrees.

In testing the waters near the bottom of the lake for one-half mile out from the shore, I found no evidence of any spring-water entering in such amount as to modify noticeably the temperature of the lake.

About 3,000 feet out it becomes shallower and at 4,000 feet the depth of the lake is only 25 feet. The taste of the water was slightly unpleasant. Its most noticeable feature next to the high temperature was its appearance when held up to the light in a clear glass. Thus observed the water appeared to be swarming with minute organisms of a variety of forms. And this was true, both of the water from a depth and of the surface-water, the difference being that in the deeper water the white specks were quite minute and globular, while in that nearer the surface many were so developed that their sack-like forms were visible. Mr. Shackleton informed me that the water first assumes this appearance in May; that it clears away during the latter part of June; that it then recurs again about the middle of July, and it continues until the middle or latter part of September. He said that on days when the wind did not blow, and the heat was great, these organisms in the water seemed to die and rise to the surface, forming often such a thick, yellowish-green scum over the lake that the track of a boat could be seen for many rods in its wake. This condition of things I have never observed, as the wind was fresh and the air cool the day I was at the lake. But every sample of water that I took was swarming with white semi-transparent organisms.

As regards the currents in the lake, Mr. Shackleton informed me that under the influence of very strong west winds, the water would be blown from the west end of the lake toward the eastern, and rise from a foot to 18 inches at Shackleton's point. Dr. Alfred Mercer observed a noticeable current setting from west to east in the autumn of 1885, when he visited the lake. It is therefore apparent, as might be expected, that the currents in the lake will sometimes be in one direction and sometimes in another, depending upon the force and direction of the wind.

As regards the chemical purity of the water of Oneida lake in the neighborhood of Shackleton's point, there can be no question, from the fact that analyses have been made by both Professor Lattimore and Professor Tucker of some six different specimens, taken at different points and at different seasons of the year.

The following are the analyses of the specimens taken by myself on July 30, 1886, sample 1 being taken 1,000 feet from the shore, sample 2, 2,000 feet from the shore, and both at a depth of twenty feet below the surface:

Analysis of Oneida Lake Water by Prof. S. A. Lattimore, July 1886.

(*Parts per* 100,000 *by weight.*)

Sample mark.	Color.	Color at 100° F.	Chlorine.	Free ammonia.	Alb. ammonia.	Total solids.	Loss on ignition.	Mineral matter.	Hardness.
No. 1..	Clear...	None...	0.3	None...	Trace...	15.20	5.40	9.80	8.71
No. 2..	Clear...	None...	0.2	None...	Trace...	15.12	5.20	9.92	8.14

Microscopic plants (diatoms, etc.,) and infusorial animals — somewhat numerous.

The four following tables give the results of analyses made in October and November, 1885:

Analysis of Oneida Lake Water by Prof. S. A. Lattimore in October and November.

October Analysis.—(*Parts per* 100,000 *by weight.*)

	No. 1.	No. 2.	No. 3.	No. 4.
Total solid residue	14.23	14.22	14.21	14.23
Chlorine	0.454	0.452	0.453	0.454
Ammonia, free	0.000	0.000	0.000	0.000
Ammonia, albuminoid	0.002	0.002	0.002	0.000

November Analysis.

	Filtered.	Not filtered.
Total solid residue	14.5	14.5
Chlorine	0.45	0.45
Ammonia, free	Trace.	Trace.
Ammonia, albuminoid	0.002	0.002

The solid residue — 8¼ grains per gallon — consists chiefly of calcium carbonate and renders the water slightly hard.

ANALYSIS — PROF. TUCKER, NOVEMBER 10, 1885.

Filtered Water (*Parts per* 100,000.)

Color and appearance, light greenish tint; appearance, transparent; odor at 100 degrees F., none.

Chlorine	0.32
Free ammonia	0.0027
Albuminoid ammonia	0.0035
Total solids	16.40
Loss on ignition	5.20
Mineral matter	11.20

Unfiltered Water (*Parts per* 100,000.)

Color and appearance, light greenish tint; appearance, transparent; odor at 100 degrees F., none.

Chlorine	0.32
Free ammonia	0.0027
Albuminoid ammonia	0.0045
Total solids	16.80
Loss on ignition	5.20
Mineral matter	11.60

It will be seen from the above tables that the free and albuminoid ammonia are so small in amount as to indicate water unusually free from putrescible nitrogenous matter. Judged from the indications of chemical analyses *alone*, the water of Oneida lake would rank with the purer waters of the State.

Its hardness in July, 1886, was between 8 and 9 in parts per 100,000. The hardness doubtless varies somewhat with the amount of water discharged by the large creeks flowing from the limestone hills to the south.

As regards the danger of contamination of the waters of Oneida lake with specific germs of disease, the following facts will show the possibility of such occurrence.

In September last I was called to investigate the cause of an outbreak of typhoid fever in the village of Camden, on Fish creek, some eighteen miles above its entrance into Oneida lake. There is a millpond at the village, made by the damming of the west branch of Fish creek, near one side of which, in shallow water without much current, there has formed a deposit of sawdust and shavings, brought down from wood-working mills a mile or two up the stream. At one side of the pond, near this sawdust deposit, is a factory in which some eighty people are employed. Camden is usually free from typhoid fever until early in August, when, for several successive years, a number of cases have occurred, the disease disappearing in September. Of the seven typhoid cases which occurred in 1886, four of the persons worked in the mill, and two were in the habit of boating on the mill-pond. One of the cases had no connection with the pond, and an examination of the premises where it occurred, proved that the well from which the patient drank was poisoned by a large and full privy vault only thirty feet from it. A number of other cases of enteric difficulty had occurred at this house. The patients working at the mill lived in various parts of the village, and an inspection of their residences showed no unsanitary conditions. The same was true of the two others who were in the habit of boating on the pond.

Late in July, or about the first of August, the water in the mill-pond fell, so that the sawdust deposits, which had previously been covered with a foot or two of water, were exposed to the hot sun. On the sixth day of August the first case of typhoid occurred and new cases were observed until the water again rose, covering the sawdust deposits. Three cases were fatal. Two of these worked in the knitting mill, and one of the persons boated on the pond, but did not work in the mill. The knitting-mill hands were not in the habit of drinking water from the pond, nor would they be likely to do so occasionally, because the water in front of the mill was offensive in odor and appearance, on account of the polluted water discharged from the mill itself, the water having been used for wool-washing, and being discolored with aniline dyes.

That a similar state of facts has existed for several years back is shown by the register of vital statistics, and by the reports of 3 physicians. The evidence was conclusive that the disease made its appearance each year when the sawdust deposits, previously under water, were exposed to the August heat, and the persons affected appeared to be those who were exposed to the influence of the pond in the neighborhood of the decaying sawdust. It is probable, therefore, that the typhoid germ has become implanted in this sawdust shallow, where it maintains its existence from year to year. Under proper conditions of temperature, and nourishment from the decaying vegetable matter, it seems probable that the typhoid plant develops and throws off spores, and that the germs reach a certain number of persons who are in the immediate vicinity. The susceptible ones are then taken ill. There is no absolute proof as to how the germs are carried from the exposed sawdust bank to the persons affected. It seems most probable that they are borne by the air, and, being taken into the mouth, are swallowed and reach the intestines. There is, of course the possibility that the typhoid patients had washed their faces in the water, but no such fact could be ascertained. At any rate it seems beyond question that a bed of typhoid fever has been growing for a number of years, in a body of decaying sawdust, in a mill-pond in Fish creek, within eighteen miles of Oneida lake.

The experiments thus far made with the typhoid germ by Dr. Pruden, of New York, show that it is not destroyed by freezing, but, after being kept in a solid mass of ice for 2 months, it retains all its powers. There is no reason at present to suppose that both the water and the ice of Fish creek might not carry typhoid germs from Camden down to Oneida lake. Wherever deposits of decaying sawdust or shavings occur on that stream these germs may take root and flourish as at Camden. Where streams have so many villages and manufactories, as there are on all the larger tributaries to Oneida lake, and where there are watering places and villages directly upon the shore, there can be no certainty that the specific germs of disease will not enter its waters.

The waters of the Erie canal are very much polluted with the excreta of men and animals, and these canal waters find their way into Oneida lake down the streams that enter from the south ; at least a dozen spill-ways, some of them 40 to 60 feet long, emptying their waters down these streams. All that part of the city of Rome lying south of the Erie canal drains into a large ditch which empties into Wood creek and thence into Oneida lake.

After careful examination I see no way of protecting the waters of Oneida lake from possible contamination from animal sources. The Erie canal is necessarily thus polluted, and its surplus waters along the whole level from Rome nearly to Syracuse, a distance of over 30 miles, must be discharged into the streams that enter Oneida lake. The surface drainage of many villages must also reach these waters; and when the city of Rome and the larger villages construct systems of sewers, it will be next to impossible to prevent their using some of the larger stream courses for the disposal of sewage; and, although the effluent of the sewers may, by proper provisions, be so purified as not to create a nuisance in the streams themselves, the waters can not be considered as fit for potable purposes.

In addition to the danger of impregnation of the waters of Oneida lake from human and other animal sources, it undoubtedly receives whatever pathogenic germs develop in the swampy and saturated lands lying along its southern and eastern sides. In the present state of knowledge, it is impossible to say exactly what these organisms are, but that swamp waters and lands, owing to the large amount of decaying organic matter and frequent high temperature, do produce organisms that affect human digestion, is an accepted gift. Diarrhœal disturbances more or less severe are to be feared from swamp waters. Doubtless the water of Oneida lake at Shackleton's Point usually contains much less swamp water than that part of the lake lying west of the entrance of Chittenango creek; but it is by no means free from water which has flowed sluggishly through the more or less saturated lands, lying between the railroad and the lake of Canastota, Oneida and Wood creeks; while in times of strong westerly wind, the water of Chittenango creek is doubtless driven eastward beyond Shackleton's Point.

The chemical purity of the water at Shackleton's Point shows that either the percentage of swamp water is small, or that it has been purified from a large amount of its organic material by sedimentation, and by so-called oxydation; but the fact that the water was found swarming with organisms in spite of its chemical purity, shows that whatever microbes are brought down from the swamps may still find favorable conditions for existence in the lake. The fact that the water of the lake swarmed with organic life in July, at the time of my visit, and that this is stated by competent witnesses to be usual during the summer months, shows that Oneida lake has conditions very favorable to the existence, development, and possible reproduction of micro-organisms, even though the water be comparatively pure chemically. It may be that the swamps on the inflowing streams, and the swamp shores of the lake, act as breeding grounds for the organisms which were observed; and that they flourish in the lake itself on account of the high temperature of the water in summer. However this may be, the fact remains that the waters of the lake in the summer do support an unusual growth of organic life.

The facts stated warrant, I think, the conclusion that Oneida lake is peculiarly liable to contamination with specific germs of disease from animal sources, and that the lake exists under conditions especially favorable to the maintenance of a prolific growth of organisms during the summer months.

If these conclusions are warranted by the facts, they prove that the water of Oneida lake is objectionable, from a sanitary point of view, and should not be used as a public supply for the city of Syracuse, provided a better one can be had.

PROPOSED CARDIFF RESERVOIR OF SYRACUSE WATER COMPANY.

Some 8 miles south of Syracuse, Onondaga creek passes through a narrow ravine perhaps 150 feet deep and not over 200 feet broad. The spot is near the southern bounds of the Indian reservation. Just above, the valley suddenly widens out, becoming three-quarters of a mile broad, and extending southward for 5 miles with comparatively slight rise. This is known as the Cardiff valley. Steep, high ridges bound it on the east and west. It is proposed by the Syracuse Water Company to build a dam in the narrows above spoken of — a dam 90 feet in height, which, with a water surface 10 feet below the top of the dam, would flood the Cardiff valley, forming a lake 4½ miles long by five-eighths of a mile wide, whose surface would be 153 feet above the Erie canal at Syracuse, and 37 feet above the surface of the present distributing reservoir. Through an iron conduit 8 miles long it is proposed to bring, by gravity, the water from the Cardiff valley to the present distributing reservoir, or directly to the city mains, as occasion may require.

With proper engineering precautions, it seems probable that the water could be retained in this artificial lake. The flow from springs, and from its water-shed of some forty square miles, would doubtless fill it, and furnish a sufficient amount of stored water to supply the city of Syracuse during the drier parts of the year, when the flow of the creek was not sufficient for that purpose.

Onondaga creek heads between 4 and 5 miles south of the upper end of the proposed reservoir. Two branches of the stream would enter the reservoir within a half mile of its head; one, Fall brook, coming from near Otisco post-office, 4 mile to the west, and the other, Loomis creek, from some 2 miles to the east. The main stream, which comes from the south, theoretically heads in the most western of the Tully lakes; but during the time of low water it receives no flow from this source, but is fed entirely from springs, some of which are remarkable for the volume of water discharged. Several minor branches would also flow into the reservoir from springs in the neighboring hills.

The sides and bottom of the Cardiff valley are so shaped that the water would be from 40 to 25 feet deep in the greater part of the reservoir. Near the head it would of course be shallower, but the extent of shallow water would be comparatively small, and this area is so situated as to receive the full flow of the main stream, and the two smaller brooks; so that there would be no stagnant or still water in the shallow parts of the reservoir.

The soil of the valley is partly gravel and partly clay. There are no large deposits of vegetable mold or swampy tracts, presenting objectionable features to the making of a reservoir; on the contrary, the site is peculiarly well adapted to the impounding of water in such a way as to maintain its wholesomeness.

There is, however, one small hamlet, that of Cardiff post-office, situated near the edge of the proposed reservoir, and there are a small number of farm houses so located, that the surface drainage from their barn yards might reach either the reservoir or some of the streams tributary to it.

On the 29th of July I examined, at 6 o'clock in the afternoon, the temperature of the water in the main stream at the lower end of the Cardiff valley, and found it to be 73 degrees, and at the upper end under the mill-dam 74 degrees. It is probable that the temperature of the water had been raised somewhat by being detained in the shallow mill-pond at the upper end of the valley. I took sample No. 4 from the stream under the mill-dam at the head of the valley, and sample No. 5 from the foot of the valley at the dam site. At both points the water had a good taste, but was slightly turbid, having a milky appearance. The stream at the dam site ripples over a stony bed, and was at this time about 13 feet wide by three inches deep. The following table gives the analysis of these two samples taken in the latter part of July:

ANALYSES OF WATER FROM SITE OF PROPOSED CARDIFF DAM ON ONONDAGA CREEK, BY PROFESSOR S. A. LATTIMORE.

Date when received, July thirty-first. (*Parts in* 100,000.)

Color and appearance clear; odor at 100 degrees F., none; chlorine, 0.3; free ammonia, trace; albuminoid ammonia, trace.

Total solids	23.50
Loss on ignition	10.50
Mineral matter	13.00
Hardness, parts per 100,000	14.37

ANALYSES OF WATER BELOW MILL-DAM AT HEAD OF PROPOSED CARDIFF RESERVOIR, BY PROFESSOR S. A. LATTIMORE.

Date when received, July thirty-first. (*Parts in* 100,000.)

Color and appearance clear; odor at 100 degrees F., none; chlorine 0.4; free ammonia, trace; albuminoid ammonia, trace.

Total solids	28.80
Loss on ignition	17.30
Mineral matter	11.50
Hardness, parts per 100,000	12.56

Microscopic plants (diatoms, etc.,) and infusorial animals, few.

These analyses show that the upper waters of Onondaga creek, which will be received into the reservoir, are so free from putrescible nitrogenous matter, that a mere trace of free and albuminoid ammonia is found in the analyses. While the total solids are somewhat large in amount, they are principally of mineral character, and will be partly removed by process of sedimentation in the reservoir. It is to suspend mineral matter that the milky hue is due, as I discovered in September, at the time of my second visit. The settlement of the water in the reservoir, and the mixing with the spring water of rain and melting snow, coming directly from the surface of the water-shed, would reduce the hardness of the water of the Cardiff reservoir, so that it would probably not exceed ten to twelve parts per 100,000. The analyses were made when only spring-water was flowing in the stream, and probably represent its maximum hardness.

While there were no natural conditions about the waters of upper Onondaga creek to throw any doubt upon their wholesomeness when running, the question as to the condition of the impounded water in the proposed reservoir would depend largely upon the summer flow into this reservoir. If the flow of spring-water during the driest periods of the year into the upper end of the reservoir was large in proportion to the amount drawn by Syracuse, the sanitary condition of the water would doubtless be better, than if the inflow of fresh-water was comparatively small, and the city dependent almost entirely upon stored water.

To determine what this minimum flow of the stream would be, I requested the Syracuse Water Company to establish four weirs according to plans which I should suggest, and at points named by me; the depth of the waters on the weirs to be observed twice a day, together with observations on the state of the weather and the amount of rain fall measured in gauges. I requested that one of these weirs be placed near the site of the proposed dam; another one on the stream above Hollenbeck's mill-dam, at the head of the reservoir; and one on each of the small brooks that enter from the east and west near the head of the reservoir.

Mr. D. H. Bruce ordered the weirs to be set and observed as I requested. Competent observers were selected. The wet and dry bulb thermometers were observed, the amount of rain fall measured, and the direction and force of the wind noted, together with the sunshine, cloudiness and other characteristics of the weather. The height of the water on the weirs was observed twice a day, the weir at the lower end of the Cardiff valley being observed at 7 A. M. and 9 P. M., and the one at the upper end, above the mill, being observed at 6.30 A. M. and 6.30 P. M.

The observations at the lower end of the valley were begun August 11, and continued until October 8, while from October 13 to October 15, the depth of the water on the weir was observed hourly for 48 consecutive hours.

These weirs were 8 feet long. The water flowed over a horizontal edge of iron one-sixteenth of an inch thick, and the head was measured on a graduated scale 3 feet back from the weir.

Through August and the first part of September, occurred one of the most remarkable droughts that has been known in the country. The total rainfall from August 12 to September 11 was only eight-tenths of an inch. The flow of the stream during this period was entirely made up of spring-water, and the flow of the springs was probably as small as ever occurs, according to the testimony of the farmers of the neighborhood.

The flow of water over the weir at the lower end of the valley was of course affected by the use of the water at the mill four miles and a half above. It probably takes from 5 to 6 hours for the water when let on at the mill to reach the lower weir. The mill was run by storing water during the night in the mill-pond, and using it as many hours as possible during the day. For this reason, the morning flow over the weir was usually less than that in the evening; the average depth of water in the evening being 1.30 inches greater than that in the morning. From August 12 to September 11, the average depth of water on the weir at the bottom of the valley was 4.0 inches. The minimum depth observed was 2.70 inches. The average depth of the water at 9 P. M. was 4.95 inches.

When the hourly observations were made in October, there had been no rain for 2 weeks, and the stream was apparently as low as in the summer. During these 48 hours, and during the day previous, the mill at the head of the valley was not running. The pond was full, and the full volume of the stream was running over the dam; so that the measurements on the lower weir during October 13 and 14 should represent the true flow of the stream. The following is the record of observations of the depth of water on the lower weir for 48 hours during October 13 and 14:

RECORD OF OBSERVATIONS OF DEPTH OF WATERS ON WEIR EIGHT FEET LONG, SITUATED IN ONONDAGA CREEK, NEAR SITE OF PROPOSED CARDIFF RESERVOIR DAM. TAKEN HOURLY FOR FORTY-EIGHT HOURS.

Date.—October 13, 1886.

	Inches.
8 A. M.	4.5
9 A. M.	4.4
10 A. M.	4.4
11 A. M.	4.4
12 M.	4.6
1 P. M.	4.7
2 P. M.	4.7
3 P. M.	4.5
4 P. M.	4.5
5 P. M.	4.5
6 P. M.	5.
7 P. M.	5.
8 P. M.	5.
9 P. M.	5.
10 P. M.	5.
11 P. M.	5.

October 14.

	Inches.
12 P. M.	5.
1 A. M.	4.7
2 A. M.	4.6
3 A. M.	4.5
4 A. M.	4.5
5 A. M.	4.4
6 A. M.	4.4
7 A. M.	4.3
8 A. M.	4.3
9 A. M.	4.3
10 A. M.	4.3
11 A. M.	4.3
12 M.	4.3
1 P. M.	4.3

	Inches.
2 P. M.	4.4
3 P. M.	4.4
4 P. M.	4.4
5 P. M.	4.4
6 P. M.	4.4
7 P. M.	4.4
8 P. M.	4.4
9 P. M.	4.4
10 P. M.	4.4
11 P. M.	4.4

October 15.

12 P. M.	4.4
1 A. M.	4.2
2 A. M.	4.2
3 A. M.	4.2
4 A. M.	4.2
5 A. M.	4.2
6 A. M.	4.2
7 A. M.	4.2

No rain during this time. Weather clear.

A properly weighted mean of these observations gives an average depth of 4.48 inches.

The minimum depth observed was 4.2 inches, and the greatest depth 5 inches. Owing to the fact of the greeter evaporation in August, I considered it possible, however, that the average discharge of this stream during the 24 hours may not have exceeded 4 inches in depth, and I have assumed this as the minimum flow of the stream during the hottest and driest months of the year. During, therefore, the worst months of the worst years that are likely to occur, the flow into the Cardiff reservoir of spring-water will probably be 3,318,000 gallons per day, the greatest part of which will enter at the upper end, where the water is shallowest.

The weir above Hollenbeck's mill, at the upper end of the proposed reservoir, was constructed in exactly the same way as the weir near the dam site. It was also 8 feet wide. Observations on this weir were not begun until August 25th. It measured of course the water received from the springs at the head of the Onondaga valley. The lowest water was from August 25th to September 9th, during which time the minimum depth on the weir was 3 inches in the morning, and 2.5 in the evening. The average morning depth was 3.25 inches, and the average afternoon depth 2.75, the difference doubtless being due to the powerful evaporation through the day. The maximum morning depth on the weir during this period was 3.6 and the maximum evening depth 3.25 — these maxima occurring on the same day, the day being noted as foggy and damp. The average depth of water in the weir during the dryest period is taken at 3 inches. The average morning depth of water on the weir from August 25th until October 8th was 3.86 inches; the average evening depth 3.42 inches; and the mean depth for the whole period 3.64 inches. From October 5th to October 8th the average morning depth was 3.68 inches, and the average evening depth was 3.62; from which fact it appears that the average flow of the spring brooks reaching the Cardiff valley in October was probably about 0.64 of an inch greater on the weir, than during the hottest and driest part of August and September, and, that the flow from the 5th to the 8th of October was almost exactly the same as the mean of the whole period from August to October.

The following table shows the depth of water flowing over the weir above Hollenbeck's mill, under different conditions:

TABLE SHOWING DEPTHS OF WATER ON WEIR ACROSS ONONDAGA CREEK, AND FLOW OF THE STREAM, NEAR UPPER END OF CARDIFF VALLEY, SOME 2,000 FEET ABOVE HOLLENBECK'S MILL.

During lowest stage of water from August 25, to September 9, 1886.

	Inches.
Mean depth of water on weir at 6.30 A. M.	3.25
Mean depth of water on weir at 6.30 P. M.	2.75
Mean depth of water on weir for 16 days	3.00
Minimum depth of water on weir at 6.30 A. M.	3.00
Minimum depth of water on weir at 6.30 P. M.	2.50

	Gals. per day.
Mean daily rate of flow of stream 6.30 A. M.	2,478,000
Mean daily rate of flow of stream 6.30 P. M.	1,944,000
Difference of rate of flow due to evaporation	534,000
Mean daily flow of stream for 16 days	2,210,000

During October 5th, 6th, 7th and 8th.

	Inches.
Mean depth of water on weir at 6.30 A. M.	3.68
Mean depth of water on weir at 6.30 P. M.	3.62
Mean depth of water on weir for 4 days	3.65

	Gals. per day.
Mean daily flow of stream for 4 days	2,900,000

During month and a half from August 25th to October 8th.

	Inches.
Mean depth of water on weir at 6.30 A. M	3.86
Mean depth of water on weir at 6.30 P. M	3.42
Mean depth of water on weir for 45 days	3.64

	Gals. per day.
Mean daily rate of flow of stream at 6.30 A. M	3,120,000
Mean daily rate of flow of stream at 6.30 P. M	2,690,000
Mean difference of rate of flow due to evaporation	436,000
Mean daily flow of stream for 45 days	2,900,000

The results enable us to interpret the observations made at the lower weir on Onondaga creek, in spite of the fact of the disturbance of the flow at the point by the Hollenbeck mill. The following table must represent very closely the actual flow of water at the lower weir near the site of the proposed dam:

Table Showing Depths of Water on Weir Across Onondaga Creek, and Flow of Stream, just Below Cardiff Valley, near Site of Proposed Reservoir Dam.

During lowest stage of the water from August 11th to September 12th.
(*Depth observed twice a day.*)

	Inches.
Mean depth of water on weir at 7.00 A. M	3.91
Mean depth of water on weir at 9.00 P. M	4.95
Minimum depth of water on weir	2.70
Maximum depth of water on weir	3.70
Probable mean depth of water on weir for 33 days	4.00

	Gals. per day
Mean daily rate of flow at 7.00 A. M	3,209,000
Probable mean flow of stream for 33 days	3,318,000

During nearly two months from August 11th to October 8th, inclusive.
(*Depths observed twice a day.*)

	Inches.
Mean depth of water on weir at 7.00 A. M	4.69
Mean depth of water on weir at 7.00 P. M	5.95
Minimum depth of water on weir	2.70
Maximum depth of water on weir	18.00
Probable mean depth of water on weir for 2 months	4.80

	Gals. per day.
Mean daily rate of flow at 7.00 A. M	4,204,000
Probable mean daily rate of flow of stream for 2 months	4,365,000

During 48 *hours of continuous hourly observations.*
October 13*th and* 14*th.*

	Inches.
Mean depth of water on weir	4.48
Maximum depth of water on weir	5.00
Minimum depth of water on weir	4.20
Mean depth of water on weir at 7.00 A. M	4.25

	Gals. per day.
Mean daily rate of flow of stream for two days	3,940,000

From the facts above given, I conclude that the average depth of spring-water, on the lower Onondaga creek weir, for the whole period from August twelfth to October fourteenth, may safely be taken at 4.5 inches, giving the average flow of spring-water in the stream during these two months at 3,960,000 gallons a day; while including water received from rainfall, the total mean daily flow of this stream was 4,365,000 gallons; 2,900,000 gallons per day entered the valley over the weir above Hollenbeck's mill, and of the remainder, 428,000 gallons per day came from Fall creek, on the western side of the valley, 127,000 gallons per day from Loomis creek, and the rest from small springs.

The rainfall during these two months was 3.9 inches. It was, as I have said, a time of remarkable drought, and may be looked upon as fairly measuring the least amount of water that will be received into the Cardiff reservoir during the driest parts of the driest years.

Syracuse is supposed to use at present some 5,000,000 gallons of water a day. More than two-thirds of this amount would therefore be supplied to the Cardiff reservoir by the inflow from the spring brooks during the driest part of the season. Such a large volume of water, flowing in at the upper end of the lake, would tend to keep the whole reservoir pure and sweet.

On the afternoon of September 22d, I examined carefully the springs which supply the waters of upper Onondaga creek. About two and one-half miles south of Hollenbeck's mill, three branches come together, in all of which the water is absolutely clear; but a mile below their junction it has the milky turbidity noticed at the upper weir. On following down the stream I found that this was due to the cutting of the stream into a clay bank, the material of which is extremely fine. Immediately below these clay banks the water is turbid, while above it is clear. The addition of this clay material to the water can do no harm, but it could easily be prevented by riprapping the banks where the cutting takes place.

About a mile above this junction of the creeks, and perhaps a little over a mile west from Tully Center, is the largest spring contributing to Onondaga creek. The flow from it is used to run a mill a short distance below the spring. I measured the flow approximately, and found it to be at the rate of 967,000 gallons per day, and this after a season of unusual drought. There are others who give the flow of this spring at a million gallons per day, and I do not doubt, that at times, it much exceeds this amount. The temperature of the water is only fifty degrees. The water deposits tufa as it comes from the ground, showing it to be quite hard.

About a mile east of this spring is another one of the same character, flowing apparently about 250,000 gallons a day, although this was not measured.

The other principal springs are situated on two brooks, from one to two miles north-west of the large spring first mentioned.

Almost the whole of the 2,900,000 gallons passing over the weir above Hollenbeck's mill must have come from these four groups of springs. The average distance from the weir to the springs is from three to three and one-half miles. No water whatever was flowing from the artificial channel which leads from the western Tully lake to the branch of Onondaga creek, in which the larger spring is situated.

So far as the natural conditions are concerned, I am of the opinion that the water of Onondaga creek can be impounded in Cardiff valley, as proposed by the Syracuse Water Company, without impairing its wholesomeness or purity, provided that the proper precautions are taken in preparing the bottom and banks of the reservoir.

As regards the danger of contamination of the water from human or animal sources, I find that the possibility of such contamination would exist at Cardiff post-office and several other points on the water-shed, but that this danger can be overcome by proper precautions.

Rules and regulations can be made for the protection of this water-shed by the State Board of Health, the regulations being particularly adapted to the circumstances of the case. Such regulations when made and approved by the county judge have the force of law, and can be rigidly enforced.— See chapter 543 of the Laws of 1885.

Owing to the steepness of the ridges which constitute the greater part of the water-shed of the Cardiff valley, the population of this area is small. The fact that it consists very largely of thin shales is favorable to the purity of the water. The shale ridges shed water rapidly from their rocky sides, while in all level places the shales absorb quite readily, holding a large quantity of water, which, after percolating through the shales, is given out in the form of springs.

In view of all the facts above stated, I conclude that the natural conditions are such that the proposed Cardiff reservoir would furnish a supply of pure and wholesome water to the city of Syracuse; that with proper precautions, the reservoir and its tributaries can be protected from contamination from human and animal sources; and that, owing to the character of the ground, it is not liable to be contaminated from swamps or other natural sources.

THE PRESENT SUPPLY OF WATER TO SYRACUSE BY THE SYRACUSE WATER COMPANY.

On the 29th of July I examined the distributing reservoir and the pumping wells of the Syracuse Water Company, taking samples of the water pumped from Onondaga creek, of the water flowing in from the springs at the south-west corner of the reservoir, and of the mixture of these two waters at the outlet of the city mains.

As before stated, this distributing reservoir is supplied from two independent sources; from a group of very large springs, the water of which is brought down by a conduit to the south-west corner of the reservoir, and by the water of Onondaga creek which is pumped up into it. The flow from the springs is sometimes so great for a number of months that no pumping is necessary. The company reports that the pumps were stopped from December 1, 1885, to May 1, 1886.

I found the water in the upper or southern part of the reservoir four feet deep and a few water plants growing in it. The temperature of the air was 68 degrees, and the temperature of the water at the pumping inlet was 70 degrees. At the mouth of the conduit from the springs, the surface temperature was 72 degrees, and the spring water flowing in, 50 degrees. Near the gate-house the temperature of the water from the bottom of the reservoir and the surface was about 73 degrees. Although the wind was blowing strong from the south-west, only a few dead algæ were drifting to the north-east corner of the reservoir. The water was slightly turbid, but had neither taste nor odor. The pumps at this time were said to be pumping about 3,500,000 gallons a day. The temperature of Onondaga creek, from which the water was being pumped, was 68 degrees. I took the following samples from the reservoir:

No. 1, from the mouth of the conduit bringing the spring-water to the south-west corner of the reservoir.

No. 2, from six feet below the surface near the outlet to the city mains.

No. 3, from the pumping inlet where the water from Onondaga creek is received.

ANALYSIS OF WATER FROM DISTRIBUTING RESERVOIR OF SYRACUSE WATER COMPANY, BY PROF. S. A. LATTIMORE.

(*Parts per* 100,000 *by weight.*)

SAMPLE MARK.	Color.	Odor.	Chlorine.	Free ammonia.	Alb. ammonia.	Total solids.	Loss on ignition.	Mineral matter.	Hardness.
Reservoir No. 1.....	Clear.	None.	0.5	None.	Trace.	101.80	29.00	72.80	56.75
Reservoir No. 2.....	Clear.	None.	2.2	Trace.	Trace.	55.52	16.40	39 12	37.62
Reservoir No. 3.....	Clear.	None.	2.3	None.	Trace.	55.40	17.00	38.40	22 86

Organisms — few.

These analyses show the water to be of excellent purity, so far as merely the amount of putrescible nitrogenous matter is concerned. The excess of chlorine over that in the other waters of this region, which have been given in the various analyses of this report may either be due to some saline matter in springs, which enter the lower course of Onondaga creek, or may possibly be due to the contamination of the stream from human sources. The former is the more probable, and yet it is, as I have before stated, conceded, that Onondaga creek for a number of miles above Syracuse is liable to such contamination.

The remarkable feature of these analyses is the great hardness of the water from the springs, this being 56.75 parts per 100,000; and the great hardness of the average water of the reservoir 37.62. Even Onondaga creek has a hardness at this part of its course of 22.86, while at the Cardiff valley it is only from 12 to 14 parts. It appears, therefore, that the water of the proposed Cardiff reservoir will be less than one-third as hard as that supplied to the city of Syracuse even when the pumps are going. During the winter when the pumps were stopped, and the whole supply of the distributing reservoir came from the springs, the supply to the city of Syracuse must have been nearly five times as hard, as it would be from the proposed Cardiff reservoir.

Should the Cardiff supply, therefore, be brought to the present reservoir, it is of the utmost importance, that the present flow from the springs should be cut off.

On the 23d of September, I visited the Onondaga hill reservoir from which a portion of the city is supplied. It is an excavation in shale, the bottom and lower part of the sides, being puddled with clay. I found it in a most objectionable sanitary condition. There is no constant flow of water into it during the summer; the water is never deep, on account of the leaking of the reservoir; and as the draught is made on it, and the surface of the water falls, there is left a margin, covered in places with a thick growth of dying and decaying aquatic plants, the odor from which was quite offensive at the time of my visit. Every shower, or the washing of the waves, carries the soluable products of this decay into the reservoir and pollutes it. I found the water turbid and shallow, and eminently unfit for potable purposes.

The fact that the waters in use and proposed for a public supply in Syracuse, range in hardness from 2.6 to 56.7 parts per 100,000, has necessarily produced much discussion as to the effects of different degrees of hardness on the health, as well as on the commercial prosperity of the city. The sanitary bearings of hardness in waters, have therefore been thoroughly investigated, and, incidentally, some valuable light has been thrown on the degree of hardness in water seriously objectionble for steam purposes.

LIMIT OF HARDNESS PERMISSIBLE IN A PUBLIC WATER SUPPLY.

It has thus far proved impossible to determine definitely the effect of hardness of water on health. Dr. Letheby made a comparison of the average death rate for five years, between a number of English towns furnished with soft-water, as compared with an equal number furnished with hard-water, the result being markedly in favor of the town supplied with hard-water—14.28 parts 100,000 equaling 10 degrees. Clark's scale being taken as the standard of hardness, all below that being considered as soft, and above that hard.

The conclusion sought to be drawn has justly been doubted, on the ground that the health of towns depends upon so many other conditions that an inference drawn from a comparison of the water supplies is not reliable, unless the other causes affecting the public health were also known and compared. But furthermore, it seems to me, even if it could be shown, in places otherwise equal from a sanitary point of view, that those supplied with hard-water were more healthful, it would still not follow that the superior healthfulness was due to hardness of water, for the soft-waters, being probably surface waters, might be more exposed to contamination, and their unwholesomeness might be due to this contamination, and not to their softness. This latter objection will apply also to the conclusion drawn in France, where out of a large number of conscripts medically examined, a larger number were rejected from soft-water districts than from hard-water districts.

The rivers pollution commission of England investigated the subject of the effect of hardness of water upon health by the same method adopted by Dr. Letheby, but taking special care to compare equal populations living in towns as nearly as possible similar in their sanitary conditions, with the result that no noticeable difference was found between the average health of equal numbers of people using hard or soft-water. They also took a large amount of medical testimony on this question, in which great difference of opinion among medical men was developed, some of them holding that waters whose hardness was more than eighteen or twenty parts per 100,000 affected the digestion of certain susceptible persons, and in extreme cases would produce calculus. No testimony, however, was offered to show that water containing less than fifteen parts per 100,000 was in any way injurious to health. They state their conclusions in the following words:

"We are, therefore, of the opinion that while waters of excessive hardness may be productive of calculus, and perhaps other diseases, soft and hard-waters, if equally free from deleterious organic substances, are equally wholesome."

LEAD POISONING.

Hardening matter in water may favorably affect the public health directly by forming protecting coating in lead pipes, through the deposition of sulphates and carbonates of lime and magnesia. If pure rain-water, or other extremely soft-water, is allowed to come in contact with lead or other metals it will often dissolve a part of the metal› the action of the water appearing to depend upon the quantity of oxygen and carbonic acid and certain salts held in solution. Where there is a large quantity of oxygen, lead is rapidly oxydized, and a part of the oxide of lead passes in solution into pure water. If, however, the water contains a sufficient quantity of carbonic acid to convert the oxygen into carbonate of lead, which is only slightly soluble, the water is much safer.

In a lecture on water before the American Institute in 1871, Prof. C. F. Chandler states his belief that well-marked cases of lead poisoning have occurred, and may occur, from the Croton water in the city of New York. In water which had been in the pipes of his own house but six hours, he found 0.11 grains of metallic lead per gallon of water. The continued drinking of water containing a less amount of lead than this has been known to produce lead poisoning, since the poison is cumulative. The danger from Croton water seemed to him so serious that he recommended the use of lead pipes lined with block tin.

In the report of the State Board of Health of Massachusetts, June 1871, will be found a full account of an investigation of the effect of the Cochituate water on lead pipes in the city of Boston, made by Prof. Wm. Ripley Nichols, one of the best American authorities, for the Massachusetts State Board of Health. The Cochituate water, it will be remembered, is extremely soft, having a hardness of 3.21 parts per 100,000. Prof Nichols says on page 35 of this report:

"With regard to the action of Cochituate water upon lead, we should infer from the small quantity of chlorides and nitrates, and from the proportionate large quantities of carbonate, that this action would not be very considerable, and we are now in a position to determine, from the actual experience of so many years, how much it really amounts to."

The water in Cochituate lake was analyzed, and failed to give indication of the presence of lead. Nine specimens of water taken in the city from various pipes, under different circumstances, all showed metallic lead in amounts varying from 0.04 parts per 100,000 to 0.19 parts, the latter being from hot-water pipes.

In private residence No. 137 Walnut avenue, July nineteenth, the water having been delivered through 100 feet or more of tin-lined pipe, and through only 10 or 12 feet of lead pipe, the pipes having been in use only six months, 100,000 parts of the water contained 0.034 parts of metallic lead. Water from the hot-water pipes of the same dwelling (this water passing through 40 additional feet of lead pipe, through a lead-lined tank, and through an ordinary copper boiler), contained per 100,000 parts of water 0.191 parts of metallic lead. Professor Nichols concludes :

"1st. That Cochituate water, which has passed through lead pipe, is never absolutely free from lead.

"2d. That when the water is first introduced into the pipes there is more action on the pipes, so far as the contamination of the water is concerned, than subsequently; but after a few days' service the quantity of lead in the water is practically small.

"3d. That there is almost always more lead in the water after it has stood for some hours in the pipes, than when it is allowed to flow freely.

"4th. That when the water passes through a lead-lined tank it will be likely to contain in solution or suspension a more considerable quantity of lead solids, from the fact that the lead is corroded more rapidly on the sides of the tank at the surface of the water. Moreover, in such tanks there is generally a considerable extent of surface of contact between solder and the lead.

"5th. That pipes used to convey *hot* water are corroded more or less rapidly, a deposit similar to that in cold-water pipes being formed, and the corrosion manifesting itself most decidedly in the vicinity of the solder points and where the pipe is sharply bent."

In spite of this action of the Cochituate water, especially hot water, upon lead pipes, Dr. Geo. Derby, the Secretary of the State Board of Health, in commenting upon the report of Prof. Nichols, says :

"No well authenticated instance of lead poisoning from the Boston water has come to our knowledge, although lead pipe is almost universally used for its distribution. The same statement may be made as regards Charleston and Worcester, and is, doubtless, true of other large cities and towns by water-works from lakes of great purity. We may conclude from experience and observation, that the character of the waters in these cities is such as to dissolve lead in so small amounts as to be generally harmless, and we use the word 'generally' advisedly, because, although paralysis and wrist-drop, and the most distinctive signs of saturation with lead, have not been observed, it does not, therefore, follow that minor obscure ailments, particularly of the nervous system, have not been aggravated or even caused by this subtle poison."

As regards the amount of lead which is dangerous for habitual use, Dr. Derby quotes Dr. Angus Smith, who says that one-fortieth of a grain per gallon will affect some persons, while one-tenth of a grain may be required for others. Dr. Banks, a high English authority, thinks that any quantity that exists above one-twentieth of a grain per gallon must be considered as unsafe, and this opinion is held by Prof. Graham, Dr. Taylor and other equally well-known chemists and physicians. Dr. Adams, of Waltham, reports a case of lead poisoning in which only 0.01 of a grain per gallon was found in the water.

In the celebrated case of the poisoning of the family of Louis Phillippe by drinking water which had been stored in a lead tank, the amount of lead was seven-tenths of a grain per gallon. This quantity affected 34 per cent of those who drank it.

At the meeting of the Manchester Literary and Philosophical Society, February 7, 1882, Dr. Wm. Thomson, F. R. S. E., reported a well marked case of lead poisoning from the corrosion of lead pipe leading from a well to a house—100,000 parts of the water were found to contain 0.285 parts of lead.

"The interesting points connected with this case are that while a number of persons were using this water, only one suffered severely from lead poisoning, although others of the family were in indifferent health previous to, and enjoying good health after, the removal of the lead pipe conveying the water from a well to the house." He says, also, "I have lately observed that the lead pipes which have been in use in Manchester for many years contaminate water left in them over night to a considerable extent, but after the water has been used for a short time during the day it is free from any appreciable trace of lead."

The water of Manchester is extremely soft.

The most recent noted case of lead poisoning in England, described in the *Chemical News* of August 25, 1882, is called the Huddersfield case, the person poisoned living at Long Lane, Dalton, in the outskirts of that town. The results of the lead poisoning were beyond all dispute and very severe. An action for damages for injuries resulting from the public water supply was brought and decided in 1882. The house was supplied from the Blackmoorfoot reservoir, an extremely soft-water. Samples of the water drawn in the plaintiff's house by Mr. Jarmain, burrough analyst, produced lead to the amount of 0.34 grain per gallon. Mr. Fairley, the Leeds public analyst, found lead to the amount of 0.4 grains, whilst Mr. A. Allen, the analyst for Sheffield, found in two samples, respectively, 0.77 and 0.84 grain of lead per gallon; while on the other hand, Dr. Tidy found in a sample of water from the plaintiff's kitchen only 0.01, and, in that from his wash-house, only 0.04 grain per gallon.

These discrepancies are quite intelligible without throwing any reflections upon the accuracy of the chemists above named, being, doubtless, due to the difference of time that the water had remained in the lead pipes.

It is stated that the waters of Halifax, Bradford, Leeds, Batley, Sheffield and Manchester, as well as that from most of the Huddersfield reservoirs, if allowed to remain in a lead pipe for eight hours, all take up appreciable quantities of the metal. One of the chemists engaged in the suit, Mr. Alfred H. Allen, in the *Chemical News* of September 29, 1882, says: "Since the date of the trial, a death has occurred at Keighley, which is suspected by the medical men to be a case of lead poisoning through the medium of water. The deceased was in the habit of drawing a glass of water from the tap the first thing in the morning, and by drinking this he would necessarily introduce into his system any lead dissolved from the pipes during the night. In his viscera I found lead. Water which had been standing in the lead pipes all night contained 0.61 grain of lead per gallon. Water taken from the neighboring main was free from lead."

A number of similar American cases are given in a report by Horatio Adams, M. D., of Waltham, Mass., in 1852, in relation to the probable effect of the introduction of Cochituate water into Boston.

The case of the city of Glasgow, in Scotland, is, however, that which is usually referred to as proving the harmlessness of extremely soft-waters as respects their action upon lead pipes. It was proposed to introduce into Glasgow the waters of Loch Katrine, which lies some thirty miles from the city. This water is extremely soft, having a hardness of about one part per 100,000. A doubt was raised as to the safety of the inhabitants, on account of the assertion, supported by the experiments of several eminent chemists, that the water, from its excessive purity, acted violently upon lead. The committee of the house of commons, therefore, to whom the bill was referred, allowed time for thorough investigation, and took testimony from the ablest chemists of the day. Dr. George Wilson, one of the most celebrated chemists, declared: "The entire amount of lead present in the water experimented on in lead pipes, both in the soluble and insoluble form, amounted to 1.58 grains in one case, and in another case to 2 grains per gallon. The amount held in solution after filtration averaged one-ninth to one-sixth grain per gallon. A water which acts thus can not possibly be conveyed through lead pipes with safety to the health of those doomed to drink it." Dr. Penny, professor of chemistry, Glasgow, stated: "The water of Loch Katrine is the purest and softest water I have examined. It acts decidedly and strongly upon lead cisterns and lead piping, both old and new. There are many soft and excellent waters that do not possess the objectionable property of acting contiuously. * * * * But we have on record a case by a distinguished chemist of Bristol, in which one-ninth of a grain of lead per gallon deranged the health of a whole community."

To place this question beyond doubt, if possible, a scientific deputation was, in 1854, authorized to take a quantity of old and new iron pipes, of old and new lead cisterns, and old and new lead pipes, the old pipes and cisterns being those which were then in use in Glasgow, to the outlet of Loch Katrine. They were there laid down in the manner of a small water-works, for the purpose of an experiment, under the charge of Mr. Mackin, the engineer in charge of the

Glasgow water-works. The chemical experiments were placed under the charge of Mr. Campbell, with whom was subsequently associated Dr. Anderson.

The results of these experiments were stated by them to be of the most satisfactory character, as proving the safety with which the waters would be delivered to the inhabitants. They made some thirty-four tests, under different conditions, and state in conclusion: "1st. That the water, after lying for a considerable time in old lead pipes and cisterns, exerts no action upon lead; that it is only after they have been six days in contact that a barely appreciable action becomes apparent, and that only in some instances.

"2d. With new lead pipes and cisterns, an exceedingly minute trace of action was generally, though not always, apparent within the first twenty-four hours, but even after six days, the lead present in the water amounted to less than one-tenth of a grain per gallon."

"3d. When the water was allowed to flow slowly through the cisterns, so as to permit the frequent renewal of their contents, which takes place when the cisterns are in actual use, not the slightest trace of action on the lead could in any case be detected by the most delicate tests."

They, therefore, advised the introduction of Loch Katrine water. Their conclusions were vigorously criticised by many of the leading chemists. They have, however, stood the test of time, for, so far as I can learn, no cases of lead poisoning are reported to have occurred in Glasgow. On the contrary, Corfield, in 1875, and Nichols, in 1883, both of them authorities, agree in stating that the water of Loch Katrine has proved wholesome as distributed in Glasgow.

After forty years of discussion of this question, sanitary authorities are not fully agreed in their opinions. About 1848, Prof. E. N. Horsford, in his report on the Cochituate water, says:

"We find ourselves at the conclusion of the literature of the old world upon this subject with these impressions:

"1st. That some natural waters may be served from leaden pipes without detriment to health.

"2d. That others may not.

"3d. That we have no method of determining beforehand whether a given water may be transmitted safely through lead."

Although great advances have been made in chemistry since Prof. Horsford summed up the case, yet the chemical action of natural waters on lead under different conditions is still surrounded with so much uncertainty, that Prof. Wm. Ripley Nichols, one of the best authorities, says, in his work on water supply, published in 1883, that

"It is a rather hazardous thing for a chemist to predict *a priori* what will be the effect of a particular water on lead pipe, under the conditions of ordinary practice. Next to no value attaches to experiments made by immersing strips of sheet lead in open or close vessels containing the water under examination. In actual practice many waters which would be pronounced dangerous on the strength of such experiments, would prove entirely harmless. The pipes very soon become covered with a naturally formed protective coating of difficultly soluble compounds of lead, and, after a slight initial action, corrosion practically ceases, if the pipes are kept constantly filled. * * * * It may be said that, while with most waters the action on the lead *practically* ceases, it probably never ceases absolutely. * * * * Water which is allowed to remain in the pipes for some time, or is drawn from hot-water faucets, may contain as much as 0.1 or even 0.2 part in 100,000, and wherever lead distribution pipes are in use, it is safer always to run to waste enough water to clear the pipes, and never to use for drinking or for cooking, a water which has passed through the pipes while hot. A similar precaution should be used in the case of new pipes: The water should be wasted intermittently but freely for a number of days."

At an extensive review of the facts and opinions embodied in the literature on this subject for the past forty years, I conclude, that the extremely soft-waters, supplying *some* of the cities and towns in this country and in England, have occasioned a few well-determined cases of lead poisoning, while most of them have not been known to produce such a result; that the well authenticated cases of lead poisoning, caused by the action of the public water supply on lead pipes and tanks, are extremely rare, but that many undetected cases of lead poisoning, not clearly marked, may have occurred. What danger usually exists can, however, generally be obviated by the simple precautions of avoiding the use of lead-lined cisterns; by allowing the water to run freely from the taps in the morning before use; and by avoiding the use of water from the hot-water pipes for culinary or potable purposes.

I conclude, further, from a review of the chemical experiments, discussions and opinions which have preceded the introduction of soft-water supplies to many prominent places, as compared with the actual experience of these towns in the use of the water, that chemical investigation can not be relied upon to determine, in advance, what effect the use of any untried soft-water will have upon lead pipes, in the ordinary conditions of city use; and that, therefore, a general review of the experience of places supplied with soft-water is, on the whole, a better guide in this matter than any *a priori* reasoning.

INDIRECT EFFECTS OF HARDNESS OF PUBLIC WATER SUPPLIES ON HEALTH THROUGH INCONVENIENCE IN USE OF HARD-WATERS.

When a public water supply is so hard as to be seriously objectionable for cooking and laundry purposes, it is often indirectly hurtful to the public health, for the following reason:

Many of the less wealthy people of a city take the public water supply into their houses, principally on account of its convenience in cooking and washing, and, having introduced it into their dwellings, they learn, gradually, to drink it in preference to the cooler and more palatable waters of the wells or cisterns from which they previously got their water. In a great majority of cases, in a thickly settled community, the waters of the wells and cisterns are liable to contamination. It is beyond all question that a good public supply is much safer. The vital statistics of towns in Europe and America show this beyond a doubt. It is, therefore, greatly for the interest of the public health that the public water supply should be so soft as not to be objectionable for culinary or laundry purposes.

In order to determine to what limit the hardness of water may rise without being considered objectionable in domestic use, I have made special inquiries in several cities where moderately hard-waters are employed, and have ascertained the degree of hardness of the waters, where I have found that they were not objected to by the people, either for culinary or laundry purposes. I may say further, that the same limit which seems to be applicable for domestic uses, can also be applied for steam purposes.

In Albany, the water supplied to the lower part of the city, and to most of the manufacturing establishments, is from Tivoli lake, in which the hardness is from 7 to 8.5 parts per 100,000. No objection is made to this water on account of its hardness, either for culinary or steam purposes.

The water supplied to the city of Troy up to 1872 had a hardness of from 9 to 11 parts per 100,000, and no complaints were made of the water on account of its hardness, for either steam or domestic purposes.

The new proposed water supply for Albany, from driven wells north of the city, has a hardness of about 12 parts per 100,000, and is not considered objectionable, on that account, by the authorities who have given their opinion in the matter.

The water of the Hudson river from Troy to Albany varies in hardness from 5 to 7 parts per 100,000.

The water of the Mohawk river, which is used for the public water supply of Schenectady, varies in hardness from 8 to 9 parts per

100,000, reaching possibly 10 parts at times. Prof. Perkins made inquiry, at my request, and finds that the water is not objected to either for domestic or steam purposes.

The public supply of the city of Auburn, N. Y., is taken from Owasco lake. The health officer of the city forwarded, at my request, a bottle of the water drawn from a faucet in his house, which proves to have a total hardness of 9.25 parts per 100,000, and hardness after boiling, or permanent hardness, 5 parts per 100,000. He says the use of the water is "pretty generally universal. Also I think this water is generally satisfactory, and our public laundries have no other supply. I have never heard any complaint of its washing qualities."

I made further inquiries, from other sources, with regard to the use of the water of Owasco lake for domestic purposes, which fully confirm the above report of the health officer.

I also addressed letters to two large manufacturing establishments that I knew had used the water from Owasco lake in steam boilers.

These special inquiries were made in regard to the water of Owasco lake, since it is geologically situated in a position quite similar to that of the proposed artificial lake, or reservoir, in the Cardiff valley. The difference in hardness between the two bodies of water will, probably, not be great, although the Cardiff reservoir may be a little harder.

The Sheldon Axle Company, whose letter is given below, has recently moved to Wilkesbarre, Pa., although they were for many years at Auburn; while D. M. Osborne & Co., manufacturers of harvesting machinery, now have one of the largest establishments at Auburn.

D. M. OSBORNE & Co.,
AUBURN, N. Y., *January* 22, 1887.

JAMES T. GARDINER, Esq., *Consulting Engineer, State Board of Health, No. 6 Elk street, Albany, N. Y.:*

DEAR SIR.— We note yours of the 21st inst., and replying beg to say we are running a battery of eight boilers, without any serious inconvenience, or without using any artificial means whatever for preventing or disposing of the scales, and are running a battery of eight; also we are using a small amount of compound for keeping our boilers clean, and with strict attention there will be no serious trouble whatever with our water.

Very truly.
D. M. OSBORNE & CO.,
By G. W. ALLEN, *Treasurer.*

SHELDON AXLE CO.,
WILKESBARRE, PA., *January* 24, 1887.

MR. JAMES T. GARDINER, *Consulting Engineer, State Board of Health, No. 6 Elk street, Albany, N. Y.:*

DEAR SIR.— Your favor of the 21st duly at hand and noted. We were somewhat troubled with scale in our boilers at Auburn, and used scale-preventer in them to quite a large extent. We do not know that it ever injured the boilers to any appreciable amount, but we were compelled to watch them closely; and by washing out and cleaning once in three or four weeks could keep them comparatively clear.

The water all through that section of the State is strongly impregnated with lime. This, of itself, from our experience, does not injure the boiler, but the boilers require more care and attention than they do where the water is softer.

Yours truly.
SHELDON AXLE COMPANY,
Per H. GILLAM, *Secretary.*

These letters show that the waters of this geographical formation, varying in hardness from 9 to 10 parts per 100,000, are not seriously objectionable for steam purposes, on account of their hardness.

The water of Skaneateles lake, which is reported by (authority unknown) to have a hardness of 10 to 14 parts per 100,000, is used for steam purposes at Skaneateles Falls, in the paper manufactory of Mr. G. F. Weeks. In answer to my inquiry as to the use of this water in boilers, he says: "We are using Skaneateles lake water in our boilers and find we get very little scale, but we use a compound to soften it, otherwise it would become thicker."

It is evident from this letter that Mr. Week's Company finds no difficulty in using the water of Skaneateles lake, although the hardness appears to be considerably greater than that of Owasco lake.

I have also inquired as to the domestic use of this water, in cottages along the lake, and find that it is considered a reasonably good water for laundry and cooking purposes.

Knowing that the "Hartford Steam Boiler Inspection and Insurance Company" inspects and insures a great number of boilers through central New York, I addressed them a letter, asking what amount of hardness, in the waters of central New York, was looked upon by them as seriously objectionable in its effect upon boilers.

The president kindly referred my letter to the chemist of the company, and forwarded his reply which is as follows:

HARTFORD, Conn., *February* 1, 1887.

GENTLEMEN.—The waters of central New York, as far as the experience of this laboratory shows, vary very much, according to the source of supply, water from wells generally being quite hard. Lime carbonate predominates in the scale matter, with more or less magnesia carbonate generally, and frequently gypsum (lime sulphate). If lime sulphate does not occur largely, an amount of lime and magnesia carbonate equal to about 20 parts per 100,000, or 14 grains to the English gallon, does not make a scale of a nature to condemn the water, though the boiler would require much attention in cleaning. Perhaps 15 parts per 100,000 of scale matter is about the average for the ordinary hard-water in the vicinity of Utica.

The water of the lakes of western New York has not been so far examined.

Respectfully.
GEORGE H. SEYMS,
Chemist.

In this letter Mr. Seyms places the limit of objectionable hardness at about 20 parts 100,000, provided too large a portion is not sulphate of lime; and states, as I infer, that 15 parts per 100,000 of hardness is about the average of the waters used for steam purposes in the vicinity of Utica.

The result of these inquiries, as to the limit of hardness permissible in a public water supply, corresponds closely with the standard fixed by the English authorities, who call waters below 14.28 parts per 100,000 (= 10 grains to the imperial gallon), soft, and those above that number hard. The water supply of London is decidedly above this limit, being from 14 to 15 grains per imperial gallon, or about 20 parts harder per 100,000.

CONCLUSIONS AS TO HARDNESS.

After reviewing all obtainable evidence on the relations of hardness of waters to health, I think the following conclusions warranted :

First. Waters having more than 15.00 parts per 100,000 of carbonate of lime, or its soap destroying equivalent in other hardening matters, are objectionable from a sanitary point of view for a public supply, when, owing to their inconvenience for culinary, laundry and other domestic purposes, such hard-water tends to encourage the continued use of wells and cisterns, to the exclusion of the water of public supplies less liable to contamination.

Second. Extremely hard-waters are sanitarily objectionable for a public supply, because they may, in susceptible persons, cause disorders of the digestion, and possibly calculus.

Third. Waters of medium hardness, having from 6 to 15 parts per 100,000 of carbonate of lime, or its equivalent in soap destroying matter, are wholesome ; are not as liable as softer-water to attack lead pipes and cisterns ; and are not usually so inconvenient for culinary, laundry and other domestic purposes, as to favor the continued use of easily contaminable cisterns and wells, in preference to the city supply, and thus indirectly endanger the public health.

Fourth. Very soft-waters, having a hardness of from 1 to 6 parts 100,000, are in themselves wholesome, and indirectly of advantage to the public health, because of their convenience in domestic use ; but they are liable, under certain circumstances, to corrode lead pipes and cisterns to a degree dangerous to the health of some who drink soft-water, which has stood too long in contact with lead, especially where the water is hot, or has free access to air, as in cisterns, the water surfaces of which are constantly fluctuating.

Fifth. The action of very soft-waters, from public supplies, upon lead usually becomes slight ; and communities using such waters can be so successfully taught to take the necessary precautions against lead poisoning, that marked disease from this cause will be extremely rare.

The following tables have been compiled in order that the total hardness of waters proposed, and in use, for public supplies, may be readily compared ; the results being all reduced to a common basis of parts per 100,000, instead of being expressed in a variety of scales of degrees, as they are in the original authorities.

TABLE SHOWING TOTAL HARDNESS OF PRESENT AND PROPOSED PRACTICABLE WATER SUPPLIES FOR THE CITY OF SYRACUSE.

BODY OF WATER.	Use of water.	Total hardness in parts, per 100,000.	Name of analyst.	Date.
Spring-water received into distributing reservoir	Part of present Syracuse supply	56.75	S. A. Lattimore	July 29, 1886
Onondaga creek at pumping station	Part of Syracuse supply	22.86	S. A. Lattimore	July 29, 1886
Water of distributing reservoir	Syracuse supply	37.62	S. A. Lattimore	July 29, 1886
Onondaga creek, near site of proposed Cardiff dam	Proposed Syracuse supply	14.37	S. A. Lattimore	July 29, 1886
Onondaga creek, head of Cardiff valley	Main tributary to proposed Cardiff reservoir	12.56	S. A. Lattimore	July 29, 1886
Fall brook	Small tributary to proposed Cardiff reservoir	15.7	W. G. Tucker	Sept. 22, 1886
Oneida lake, 1,000 feet north of Shackleton's Point	Proposed Syracuse supply	8.71	S. A. Lattimore	July 30, 1886
Oneida lake, 2,000 feet north of Shackleton's Point	Proposed Syracuse supply	8.14	S. A. Lattimore	July 30, 1886
Oneida lake, four miles from east end of lake and one and one-half miles from north shore	Proposed Syracuse supply	11.14	Reported by Central City Water Works Co. to J. T. Gardiner, Jan. 25, 1887	May 21, 1885
Oneida lake, South bay, 320 rods off shore		11.14	J. T. Gardiner, Jan. 25, 1887	May 21, 1885
Oneida lake, 500 feet off shore, at Chittenango creek		18.84	J. T. Gardiner, Jan. 25, 1887	May 21, 1885
Salmon river north branch	Proposed supply for Syracuse	2.64	S. A. Lattimore	July, 1886
Salmon river, east branch	Proposed supply for Syracuse	3.57	W. G. Tucker	July, 1886
Skaneateles lake	Formerly proposed for Syracuse	10.00 to 14.00	Scale and auth'ty unknown	
Water used for steam about Utica		15.00	G. H. Seyms	1887
Tully lakes	Formerly proposed for Syracuse	5 to 8.6	C. F. Chandler	1871
ENGLAND AND SCOTLAND.				
New River Water Co.	London supply	20.0	J. A. Wanklyn	1874
Thames river	London supply	22.1	J. A. Wanklyn	1874
Hampstead Water Co.	London supply	14.00	Graham Miller & Hoffman,	1851
Kent Water Co.	London supply	22.85		
Derbyshire Hills	Manchester supply	2.86	J. A. Wanklyn	1873
Loch Katrine	Glasgow supply	1.20	T. Anderson & D. Campbell	1854
River Dee	Aberdeen supply	1.7 to 2.5	J. Smith	1851
River Tay	Perth supply	3.43	F. Perry	1854
Twelve important Scotch lakes and streams		1.21 to 1.35	T. Anderson & D. Campbell	1854

TABLE SHOWING THE TOTAL HARDNESS OF VARIOUS PUBLIC WATER SUPPLIES AND BODIES OF WATER PROPOSED AS PUBLIC SUPPLIES.

NAME OF BODY OF WATER.	City supplied.	Total hardness in parts, per 100,000.	Authority.	Date of authority.
Croton river	New York	4.20	C. F. Chandler	......
Hemlock lake, water of inlet	Not used	5.71	S. A. Lattimore	1872
Water of Hemlock lake	Rochester	1.94	S. A. Lattimore	1872
Genesee river	Rochester	4.28	S. A. Lattimore	1872
Lake Ontario, at Charlotte	Formerly proposed for Rochester	3.90	S. A. Lattimore	1872
Hudson river, above Lansingburgh	Proposed Troy supply	3.80	C. F. Chandler	1884
Hudson river	Troy additional supply	4.50	C. F. Chandler	1884
Hudson river	Albany additional supply	5 to 7	C. F. Chandler	1884
Driven wells	Albany new supply	12.0	A. R. Leeds	1884
Piscawen creek and reservoir	Troy supply before 1872	10.57	E. Nichols	1872
Tivoli lake	Supply for lower parts of Albany	7 to 8.50	C. F. Chandler	1884
Mohawk river	Schenectady, N. Y	8 to 9	C. F. Chandler	1884
Owasco lake	Auburn, N. Y	9.25	W. G. Tucker	1887
Oswego river	Oswego, N. Y	9.90	Quoted from report of A. R. Leeds	......
Gunpowder creek	Baltimore, Md	9.30		
Otsego lake	Cooperstown, N. Y	8.92	E. Waller	1886
Conduit water	Cambridge, Mass	10.0	Report of E. S. Wood	1879
Cochituate water	Boston, Mass	3.21	....	......
Connecticut river	Hartford, Conn	2.32	B. Silliman, Jr	1861
Delaware river	Proposed supply for Philadelphia	3.40	A. R. Leeds	1883
Schuylkill river	Supply of Philadelphia	7.40	A. R. Leeds	1883

CONCLUSIONS RESPECTING HARDNESS OF WATERS PROPOSED FOR SYRACUSE SUPPLY.

It appears from the latter table, that the proposed Salmon river supply is much the softest, being 2.60 to 3.60 parts per 100,000; that the Oneida lake supply is next, ranging from 8.0 to 9.0 parts per 100,000, according to my samples taken in summer, and being about 11.14 in May, according to the report of the Central City Water Works Company; while the proposed Cardiff reservoir will be a little the hardest, having a probable hardness not exceeding from 10 to 12 parts per 100,000, depending upon what proportion of the water in the reservoir is spring water, and what rain-water, directly from the watershed. All of these waters are within the standard of soft-water, fixed by the English authorities; and none of them can be considered seriously objectionable, either for domestic or steam purposes, on account of their hardness. The difference between the hardness of Oneida lake, and the probable hardness of the Cardiff reservoir, will probably not average over 2 to 3 parts per 100,000 of hardening matter, but both of these waters are very much harder than that of Salmon river, which is extremely soft. So far as their hardness is concerned, no sanitary objection can be made to either of them, except to Salmon river, the water of which is so soft that it may attack the lead of lead pipes and cisterns, and unprotected surfaces of iron. Danger from this source may, however, be guarded against by proper precautions.

SUMMARY.

The city of Syracuse has a public water supply coming from two reservoirs, much the greater part of the water being furnished by what is called the distributing reservoir, on the hill overlooking Onondaga valley, near the south boundary of the city. This reservoir, through part of the year, receives water from a large group of springs lying to the south-west of it, and from Onondaga creek, the water of which is pumped into the reservoir.

The water of this reservoir is objected to on account of its hardness, which varies in proportion to the amounts received from the springs, or the creek. For several months during the winter, the water of the reservoir is from the springs alone, which, at the time of my visit, discharged water with a hardness of 56.75 parts per 100,000. The creek water at this point has a hardness of some 23 parts. The mingled waters, in the reservoir in July last, had a hardness of 37.6. The objections to this water on account of its hardness are therefore well founded.

It is also objected, that the water is pumped from the creek after it has passed through many miles of channel, where it is unavoidably exposed to contamination. This objection is also well founded.

The second reservoir, on Onondaga hill, is filled from surface water, and has no permanent supply of living water. It is shallow, and the bottom and sides are in places thickly covered with vegetation in hot weather. The temperature of the water is necessarily high in summer; and the water of this reservoir is properly objected to, as being liable to serious contamination from vegetable matter.

In view of these facts, various new sources of water supply have been proposed, several of which are practicable, both from a legal, financial and engineering standpoint.

The State Board of Health has been asked to decide as to the relative sanitary merits of the proposed practicable supplies.

The matter having been referred to me for investigation and report, beginning in July last, examinations have been made of all the conditions and environments of these waters supposed to affect their sanitary qualities.

The results of observations have been carefully studied and compared, and a full discussion of the facts and their bearings given in the preceding pages of this report. By an examination of the geology of the various water-sheds; of their topography; and of their surface conditions, as regards the character of their vegetation and uses; by a survey of the industries, distribution and amount of population, and other artificial features of the water-sheds, due to modification by man; by determining the general character and variations of climate under which the waters have their sources, or would be impounded; by noting the character of the channels of the streams, and of the basins in which the waters are, or would be, accumulated; by chemical analyses of the waters in question; by ascertaining approximately their tendency to support large growths of minute organisms; by observations of their temperatures, and by careful sanitary investigation into the cause of typhoid fever, occurring in connection with one of the upper streams; I have endeavored to determine:

First. The liability of each proposed water supply, to contamination by specific germs of disease from animal sources, or by those microbes bred in swamps, which, either from their quantity or their character, are considered to create diarrhœal disturbances; and,

Second. To determine in regard to each body of water whether, if impregnated with pathogenic microbes, it presented those conditions most likely to favor their existence and reproduction; adopting for sanitary standards, that those waters are best which are least likely to be impregnated with pathogenic germs; and which are least likely to favor the development of such organisms, should they enter the water — assuming, of course, that the waters are sufficient in quantity, are palatable, and are free of danger from mineral matter.

THE SALMON RIVER SUPPLY.

The water supply, proposed to be secured by damming the Salmon river five miles below Redfield, has the advantage of impounding water from a water-shed of from 180 to 200 square miles in extent, some 80 per cent of which is still covered with primeval forest, and will probably long continue in this condition. During the dry months of summer there is, doubtless, still a large flow from springs on this water-shed. The climate is cool — the nights even cold. The brooks have their sources on plateaus, 1,200 to 1,500 feet high, from which they descend to the river, flowing rapidly along stony channels. Even in the slower parts of the stream courses, there seems to be little tendency to promote vegetable growth, owing probably to the coldness of the waters. The underlying rocks and surface boulders are hard, gray sandstones, and the waters are therefore very soft. The water-shed is far removed from populous regions; contains no tanneries; very few saw-mills; and only a few little hamlets, which can be placed under such regulations, by the State Board of Health, as to prevent danger to the water from human sources. In fact, the conditions are such as to reduce the danger of contamination of these waters by specific germs of disease to the very minimum, except so far as they may possibly be affected by microbes, developed in certain narrow bands of swampy valley, that occur on some of the tributaries to the north branch of Salmon river, Owing, however, to the coldness of the waters, the distance that they run down rocky channels before reaching the reservoir, and the opportunities afforded, both for thorough oxydation and subsidence, in the rapids and pools; and owing to the really very small area of swamp, the danger from this source must be considered small. The taste of the water is good, and the total amount of putrescible nitrogenous matter is small, even though the water is deeply colored with a brown or mahogany red, depending upon the depth of water seen. It has been shown that this depth of color does not indicate excessive amounts of organic matter; but that it probably comes from algæ containing very intense coloring matter, so that a small amount can deeply tinge a large volume of water.

Owing possibly to the fear of prejudice against the water, on account of this coloring matter, it has been recently proposed to place a dam above the entrance of the north branch, which is the deeply colored stream, and receive into the reservoir only the waters of the eastern branch, which have only a faint tinge of color, and which are of exceptional purity. The water-shed of the east branch, which is about 80 square miles, is of sufficient size to furnish enough water for the use of Syracuse; but I have no means of knowing what the summer flow of this branch is, as the gaugings, which I had hoped would be taken during the summer, were not made. At the time of my visit the flow of this stream was probably from four to six million gallons per day, and this was evidently largely from springs; but owing to the geological condition of the water-shed, I should think these springs likely to decline largely in volume after a long dry period. Even, however, with a small summer flow into the reservoir during the driest period, it would in that climate doubtless be practicable to impound water in a basin of the character there existing, without impairing the quality of the water. Assuming that the quantity is sufficient for an ample supply to the city, I can see no possible sanitary objection to the waters of the east branch of Salmon river. Owing, however, to the extreme softness of the water, it may attack metals, both iron, copper and lead, and so when introduced into Syracuse occasion metallic poisoning, unless proper precautions are used.

The chemical analysis of the east branch just above its junction with the north branch, by Professor Lattimore, the sample being taken July 23d, is as follows:

(*Parts in* 100,000.)

Color and appearance clear; odor at 100 degrees F., none; chlorine, trace; free ammonia, none; albuminoid ammonia, trace.

Total solids	6.72
Loss on ignition	3.72
Mineral matter	3.00
Sulphates	None.
Nitrites and nitrates	None.
Diatoms and desmids	Few.
Total hardness	3.57

THE ONEIDA LAKE SUPPLY.

Oneida lake, a body of water some 20 miles long by 4 miles broad, and lying only 14 miles north-east of Syracuse, presents, for a public water supply, certain engineering advantages, on account of its proximity to the city, and the manifestly unlimited quantity of water. It is, however, a shallow lake, the greater part of the deeper portions being only from 25 to 35 feet deep, while the water along the shores is very shallow. The shores of the lake are flat along the eastern, southern and western sides. On the southern and eastern sides extensive tracts of swamp and saturated lands drain into the lake. The streams entering on these sides are sluggish, and contain in summer a thick growth of vegetation for the last few miles of their courses. The streams from the northern side have some of them brought down and deposited saw-dust in the lake.

The temperature of the water, even at a depth of 20 feet, was found to be 73 degrees, while the surface temperature was 77 degrees on the 30th of July, when the temperature of the air was only 76 degrees in the shade. In the hotter periods of summer the temperature doubtless rises much above these figures. The water was found filled with minute organisms, which are said by Mr. Shackleton to die and rise to the surface, forming a scum in the hottest days of summer, when it is calm. The death of these organism is probably due to lack of aeration of the water, which takes place when wind is rippling the surface. The lake receives all the overflow of the long level of the Erie canal for more than 30 miles; or rather the overflow is received into sluggish creeks, which discharge into the lake. On the streams of the water-shed of the lake are situated many large and prosperous towns, the drainage from some of which reaches the tributaries of the lake. In Fish creek, the principal tributary to the east end of the lake, are decaying deposits of sawdust and shavings, in one of which, at Camden, 18 miles from the lake, typhoid fever plants have been growing for several years and causing annual outbreaks of the disease at Camden in midsummer, when the water falls so as to expose the sawdust beds to the sun and air. There are several villages and watering places on the shores of Oneida lake.

For these reasons it is impracticable to prevent the specific germs of disease, or what are known as pathogenic germs, from entering the waters of Oneida lake; in other words, to prevent its contamination. The shallowness of the lake, the proximity of swamps, and the high temperature of the water are conditions which evidently favor the existence of organisms, as is shown by the large amount of minute life, which the waters contained in the latter part of July. At this time, I found the taste of the water slightly unpleasant.

I took samples for analyses, 20 feet below the surface, at 1,000 and 2,000 feet distance from the shore, off Shackleton's Point. The analyses by Prof. Lattimore are as follows:

Analysis of water of Oneida lake 1,000 feet north of Shackleton's Point, 20 feet below surface.

(*Parts per* 100,000.)

Color and appearance, clear; odor at 100 degrees F., none; chlorine, 0.3; free ammonia, none; albuminoid ammonia, trace.

Total solids	15.20
Loss on ignition	5.40
Mineral matter	9.80
Hardness	8.71

Microscopic plants (diatoms, etc.,) and infusorial animals, somewhat numerous.

Analysis of water taken 2,000 feet north of Shackleton's Point, 20 feet below the surface, depth of lake being 33 feet:

Color and appearance, clear; odor at 100 degrees F., none; chlorine, 0.2; free ammonia, none; albuminoid ammonia, trace.

Total solids	15.12
Loss on ignition	5.20
Mineral matter	9.92
Hardness	8.14

Microscopic plants and infusorial animals, somewhat numerous.

In spite of the fact that these and other analyses show that Oneida lake at this point does not contain a large amount of putrescible nitrogenous matter, it seems to support through certain months of the year a profuse growth of organisms, whose death and decay would certainly furnish ample food for the development of microbes, while the high temperature of the waters would be most favorable to their development and reproduction.

The lake being exposed to receive the germs of harmful microbes, both from swamps and from the pollution of its tributaries, it must be considered as a doubtful source of supply, and for that reason objectionable, if one of greater sanitary certainty can be had.

It is not a very soft-water, but belongs to the class of water of medium hardness.

CARDIFF RESERVOIR.

The Cardiff reservoir would be created by building a dam some 200 feet long by 90 feet high, across a very narrow point in the valley of Onondaga creek, and thus flooding that part called the Cardiff valley, and making an artificial lake 4½ miles long by five-eighths of a mile broad. The shores of this lake would be steep except at the upper end, the depth through the greater part of it being from 30 to 40 feet. The principal inflow would be into the upper end of the reservoir, where it would receive the waters of Onondaga creek at the extreme southern point ; Fall creek from the west, and Loomis creek from the east. Besides this, numerous small springs would be received for many months of the year along the edge of the reservoir.

As shown by the measurements over properly constructed weirs, during the long season of great drought last summer, the flow of Onondaga creek into the upper end of the lake would be 2,900,000 gallons daily during the lowest stages of the water. The water is pure spring-water, supplied principally by 3 groups of large springs, situated from 3 to 5 miles above the head of the reservoir. Fall creek would contribute daily 428,000 gallons of spring water, and Loomis creek 127,000 gallons per day during the similar periods of drought. The total flow of spring water into the reservoir for the 2 driest months of dry years would be about 4,365,000 gallons per day, as shown by the measurements on the weir near the site of the proposed dam. The water of this reservoir would, therefore, not be stagnant water, stored during the wetter months for use in the summer ; but would be constantly refreshed by a volume of spring-water equal to, at least, two-thirds of the amount which would be drawn from the reservoir for the present use of Syracuse.

The topography and soil of the reservoir, and the coldness of the waters in the brooks, which even on the close of a summer's day, on July 29th, was only 73 to 74 degrees in the Cardiff valley, indicate that the water will be stored under conditions that will not impair its sanitary qualities. The water taken just below Hollenbeck's mill-pond, and also at the lower end of the Cardiff valley, after the stream had meandered through comparatively level regions for 5 or 6 miles, showed very few organisms visible to the eye. The taste was excellent. One of the springs at the head of the Cardiff valley was found to be flowing at the rate of nearly 1,000,000 gallons a day, the temperature of the water being about 50 degrees. There need be no swampy places along the edge of the reservoir, and there are no swamps upon the water-shed contributing to it. This water-shed is some 40 square miles, the underlying rocks being Hamilton shales, except some hill-tops, where the Tully limestone occurs from 12 to 16 feet thick. The soil is sand, gravel and clay ; but the steep, high shale ridges have but little earth upon their slopes. The reservoir will receive spring water of the character which was flowing in the streams at the time of my observations, and also a large amount of rain-water, discharged directly from the slopes of the high ridges which surround it. This rain-water will be softer than that of the springs, and will tend to reduce the hardness of the water in the reservoir ; the resulting mixture in the reservoir varying in hardness with the changing proportions of spring and rain-water. It will probably average from 10 to 12 parts of hardness in 100,000. There are comparatively few houses on the water shed ; and there is one small hamlet in Cardiff valley, which will be near the reservoir. Under proper rules and regulations made by the State Board of Health, according to chapter 543, Laws of 1885, it will be possible to protect the reservoir and its tributaries from all reasonable probability of contamination from animal sources. The following are the analyses of samples of water taken by me from Onondaga creek, just at the head of the proposed reservoir, and at the lower end of the valley near the dam site. The analyses were made by Professor Lattimore.

Water of Onondaga creek from below Hollenbeck's mill, at the head of Cardiff valley.

(*Parts per* 100,000.)

Color and appearance, clear; odor at 100 degrees F., none; chlorine, 0.4 ; free ammonia, trace ; albuminoid ammonia, trace.

Total solids	28.80
Loss on ignition	17.30
Mineral matter	11.50
Hardness	12.56

Microscopic plants and infusorial animals, few.

Water from Onondaga creek near site of proposed dam at lower end of Cardiff valley.

(*Parts per* 100,000.)

Color and appearance, clear; odor at 100 degrees F., none; chlorine, 0.3; free ammonia, trace; albuminoid ammonia, trace.

Total solids	23.50
Loss on ignition	10.50
Mineral matter	13.00
Hardness	14.37

Microscopic plants and infusorial animals, few.

From all the facts and conditions observed, regarding the waters of upper Onondaga creek and their environment, I conclude that the natural conditions are such as not to render the waters liable to contamination by disease-producing microbes; and that the conditions in the proposed Cardiff reservoir will not be such as to favor the development of micro-organisms; and that the waters, both of the reservoir and its tributaries, can, by proper precautions, be protected from contamination with pathogenic germs from animal sources.

While the water of the reservoir will possibly have from two to three parts of hardening matter per 100,000 more than Oneida lake, it will not be classed as a hard-water, but as belonging to the intermediate grade, between hard and soft. There is no probability of its acting upon lead pipes.

Because the waters of Cardiff reservoir and its tributaries are exposed to very few sources of contamination, from all of which the waters can be protected; because the conditions of the proposed reservoir will not be such as to specially favor the development of micro-organisms; and because the water is of good taste, sufficient quantity and free from harmful mineral ingredients, or other qualities that might impair its character, I am of the opinion that there is every reason to suppose that the water from the proposed Cardiff reservoir would furnish a pure and wholesome supply to the city of Syracuse.

RECOMMENDATIONS.

I, therefore, recommend the State Board of Health to advise the mayor and common council of the city of Syracuse:

First. As regards the Salmon river supply, that a reservoir filled with water from the east branch of Salmon river could be thoroughly protected from danger of pollution, by the entrance of disease-producing micro-organisms; that the conditions and environment of the waters would be such as not to favor the development of micro-organisms; and that the other qualities of the water are so favorable that a city supply from this source would be pure and wholesome, and be likely to continue so.

Second. As regards the Oneida lake supply, I recommend that the mayor and common council be advised that the waters of that lake and its tributaries can not be protected from possible contamination with the disease producing germs from a number of sources; that the natural conditions of the lake are such as to favor the development, and possible reproduction, of microbes in the lake and some of its tributaries, and, that the dangers which menace the waters of Oneida lake will probably increase. For these reasons a supply from this source must be considered a doubtful sanitary character, and should not, therefore, be adopted if a better supply is available.

Third. As regards the proposed Cardiff reservoir, I recommend that the mayor and common council be advised that the Cardiff reservoir and its tributaries would be exposed to but few sources of contamination from disease-producing microbes; that from these sources of danger it can be amply protected; that the waters of the reservoir and its tributaries will not present conditions specially favorable to the development of micro-organisms; and that the other qualities of the water, together with the large quantity of spring water which will be discharged into the reservoir in the driest times, are conditions which warrant the conclusion that a city supply from this source will be pure, wholesome and sufficient.

Very respectfully yours.

JAMES T. GARDINER
Consulting Engineer.

ALBANY, *March* 8, 1887.

ALBANY, *March* 14, 1887.

To His Honor the Mayor and the Honorable the Common Council of the City of Syracuse, N. Y.:

GENTLEMEN.— At a meeting of the State Board of Health, held at Albany, March 10, 1887, the within report of Mr. James T. Gardiner on the available sources of water supply for the city of Syracuse was submitted, accepted by the board, and referred to the executive committee for final action. The executive committee approve and adopt the conclusions and recommendations of Mr. Gardiner, and direct the report to be transmitted to the mayor and common council of the city of Syracuse as the report of the board.

Respectfully transmitted by order of the executive committee.

[L. S.] LEWIS BALCH,
Secretary and Executive Officer.

REPORT

ON THE

Sanitary Protection of Hutchinsons River and the Reservoir Furnishing the Public Potable Water Supply of the Village of Mount Vernon, N. Y.

By James T. Gardiner, C. E.

August 1, 1887.

Lewis Balch, M. D., *Secretary State Board of Health:*

Dear Sir.— In accordance with your direction I reëxamined the reservoir of the Mt. Vernon Water-Works Company, and a part of the stream, Hutchinsons river, which supplies the reservoir. The company have already cleaned out the bottom of the reservoir, deepened the upper part, and put the shores in excellent condition. But they are still further improving it by raising the dam so as to give 8 feet of water in the shallowest or upper part of the reservoir. When the reservoir is in perfect order, they desire to make any changes that are required along the course of the stream. They need protection, as soon as possible, on account of the rapid settlement of the land above the reservoir. I herewith submit for approval rules for the protection of this water-shed which I think will secure the waters from pollution without unnecessarily infringing on private rights.

Very respectfully.

JAMES T. GARDINER,

Consulting Engineer.

RULES AND REGULATIONS FOR THE SANITARY PROTECTION OF HUTCHINSON'S RIVER AND THE RESERVOIR FURNISHING THE PUBLIC POTABLE WATER SUPPLY OF THE VILLAGE OF MT. VERNON.

PRIVIES NEAR STREAMS, SPRINGS OR WATER-COURSES.

Rule 1.

No privy shall be located within 50 feet of any spring, stream, or dry water-course, the water from which when running empties eventually into Hutchinson's river above the reservoir.

Rule 2.

Any privy situated within 75 feet of the reservoir or of any stream, spring, or dry water-course, the water from which when running empties into Hutchinson's river above the reservoir, shall be constructed without a vault and shall have under the seats half barrels, tubs, pails, or water-tight boxes or troughs arranged to be easily removed, emptied, cleaned and returned to their place under the privy seats. Ashes or dry earth should daily be used in these privies as a deodorizer and absorbent.

Rule 3.

SECTION A. The owners or occupants of premises having privies with tubs, pails or boxes, shall cause the contents to be removed and the receptacle to be cleansed as often as is necessary to keep the privy in such sanitary condition that no pollution of the soil shall occur.

§ B. The contents of the said privies shall be disposed of in such a manner that they can not be washed into any stream, dry watercourse, ravine, spring or well on the Hutchinsons river water shed, either over the surface or through the subsoil, and the excremental matter shall be so placed as not to cause an offensive nuisance.

Rule 4.

If, owing to the porous character of the soil, the height and flow of the surface or subsoil waters, the steepness of the slopes, or other conditions of the locality, it shall be the judgment of the local board of health, or of the State Board, that the excremental matter from any privy or drain may be washed on the surface or through the soil into the reservoir or into some neighboring spring or water-course tributary to it, then after due notice to the owners or occupants of these premises, their privy shall be made to conform to the rules governing privies situated within 75 feet of water-courses.

HOUSE SLOPS, SINK WASTES, LAUNDRY WATER AND OTHER SEWAGE.

Rule 5.

SECTION A. No sewage, house slops, sink wastes, water in which clothes have been washed or rinsed, nor any other polluted water shall be discharged or thrown into any stream, spring or dry water-course on any part of the water-shed draining into Hutchinson's river and the reservoir; nor shall any such polluted waters be thrown upon the ground or into it where they may pollute the reservoir or any spring, stream or water-course on this water-shed.

§ B. Neither clothes, animals, vehicles, nor anything which pollutes water shall be washed into Hutchinson's river, or in the springs or streams which flow into it and the reservoir.

GARBAGE AND REFUSE.

Rule 6.

No garbage or refuse shall be thrown into any spring or stream on this water-shed, or into any reservoir, nor shall any such substance be placed where they may be washed into these springs or streams.

ANIMAL MANURES.

Rule 7.

No stable, pig-sty, hen-house, barn-yard, hog-yard, hitching or standing place for horses or cattle, or other place where animal manure accumulates, shall be so constructed, located or maintained that the manure or leaching from it may wash into Hutchinson's river or into any spring, stream or dry water-course running into it and the reservoir.

ANIMAL AND VEGETABLE MATTER.

Rule 8.

No dead animal, bird or fish, nor any filthy or impure matter, nor any decayed fruit, vegetable substances, leaves, sawdust, roots, branches or trunks of trees in any condition of their growth or decay shall be thrown into any spring, or stream, on this water-shed or into the reservoir.

MANUFACTURING WASTES.

No waste products, putrescible matter or polluted waters, from any slaughter-houses, cheese-factories, wine or beer vaults, breweries, cider-mills, tanneries, saw-mills, or other manufactories shall be thrown or allowed to run into any pond, spring, stream, or dry water-course on any part of this water-shed.

WASHING SHEEP OR OTHER ANIMALS.

Rule 9.

No sheep or other animals shall be washed in the reservoir or in any influent stream within 5 miles of it; nor shall any diseased animal be washed in any spring, pond or stream on this water-shed.

MANAGEMENT OF THE RESERVOIR.

Rule 10.

The reservoir shall not be unnecessarily drawn down during the warm months, but shall be kept as deep and as nearly at a uniform level as practicable, to prevent the pollution of the water with dead organic matter.

Rule 11.

No filter or screen shall be used when in a filthy condition and liable to pollute the water in the main; and no filter or screen shall be used at the head of the main which can not be constantly examined and cleaned.

PENALTY.

In accordance with chapter 543 of the Laws of 1885, a penalty of $50 is hereby imposed upon any person or persons guilty of violation of or non-compliance with any of the above given mandatory rules or regulations, to be recovered under said act.

Approved by order of the State Board of Health.

THOMAS NEWBOLD,
President.
LEWIS BALCH,
Secretary.

FOOD AND DRUGS.

REPORT

OF

WILLIS G. TUCKER, M. D., PH. D.,

ANALYST OF DRUGS.

LEWIS BALCH, M. D.,

Secretary of the State Board of Health of New York:

SIR.— My last annual report covered the 10 months ending December 17, 1886. During the period of about 11 months which has elapsed since that report was made, the work has been carried on under your direction substantially in the manner proposed in that report, except during the months of August and September, when the work was suspended by your order. The present report, therefore, gives the result of about 9 months of work, during which time, 326 samples of drugs and pharmaceutical chemicals and preparations have been collected and examined. Monthly reports have, as heretofore, been made to the Board, and these have been accompanied by separate reports on each of the samples examined, stating the name and record number of the article; name and place of business of the dealer from whom purchased; date of purchase, and amount called for; price paid, and name of collector. These reports have also given the quality of each article as determined by the examination made, samples being classed as of "good quality," when they fulfill the requirements of the United States Pharmacopœia or fall below the same only in some trifling and unimportant respect; of "fair quality," if, while not fully up to the pharmacopœial standard, they are evidently neither intentionally adulterated nor decidedly below such standard, and of "inferior quality," if clearly adulterated or falsified; lacking in any important constituent; deficient in strength from improper manufacture, partial or complete decomposition or other causes, or containing an undue amount of impurity. In some cases, through ignorance or intent, a wrong article has been sold or some inferior article, of a nature similar to that called for, has been substituted, or the article supplied has been found to possess excessive strength. Such samples have been classed under the head "not as called for," and in the monthly reports particular attention has been drawn to such sales. The reports have likewise stated the respects in which those samples, not of the proper quality, have been deficient or inferior, and have given such other particulars as was deemed necessary in special cases. These reports, not having been published elsewhere, the results are now collated and embodied in this annual report.

SELECTION OF SAMPLES.

As stated in the last annual report, no attempt has been made to collect a great variety of articles, since many drugs and medicinal compounds are practically never adulterated nor falsified. Substances were selected of such a nature as would best test the knowledge, reliability and integrity of the dealer in a fair manner, none but officinal substances being called for, and rarely used or otherwise exceptional articles being omitted. No medicinal alkaloids or preparations containing them were collected, since these constitute the department assigned to another analyst. For further particulars concerning the selection of samples, and reasons for choosing the articles purchased, reference is made to my last annual report. (Seventh Annual Report of the State Board of Health, pp. 426–7.)

NOTIFICATION OF DEALERS.

Notices have, as heretofore, been sent from the office of the Board to those dealers whose samples have been reported as of inferior quality, warning them to desist from selling such articles, and if after two such notifications have been sent articles of inferior quality are sold, the name of the dealer is published. In many instances, dealers who have received these notifications have written asking for further information, or explaining, apologizing for, and, in a few cases, denying the sale of the sample, but in no case has it been shown that any reasonable ground for complaint existed.

COLLECTION OF SAMPLES.

Of the 326 samples examined, 195 were purchased under my direction by Mr. A. G. Losee, of Albany, and 131 by Mr. W. L. Kiefer, of Rochester, acting under instructions received from me. In each and every instance a written order has been tendered, which order has given in full the officinal names of the articles called for and the amount desired. No valid excuse, therefore, can be urged by the seller for any error or substitution of one article for another in the filling of so explicit an order. All samples have been duly numbered, fully labeled, the original labels also being preserved, and kept for subsequent examination, if necessary, in any disputed case.

The following table shows the nature and number of the samples collected, and the locality from which they were obtained. The average cost, including collectors' traveling expenses and per diem, has been 30 7-10 cents per sample. Time and expense have been saved by the analysts procuring, through their collectors, samples for each other, thus rendering the sending of a collector to distant parts of the State unnecessary, and as the work progresses this course will be more largely followed. The fact has again been observed that the price paid bears but little relation to the quality of the article purchased, the highest priced samples being frequently of the poorest quality, and *vice versa:*

TABLE OF SAMPLES, ETC.

ARTICLE.	PLACE WHERE PURCHASED.													
	Albany.	Amsterdam.	Fort Edward.	Fort Plain.	Glens Falls.	Hudson.	Little Falls.	Poughkeepsie.	Rochester.	Sandy Hill.	Schenectady.	Troy.	West Troy.	Total number.
Acetic acid					1					1				2
Acetic acid, diluted		3		2			3	11	15					34
Calomel					2					1				3
Chloroform, purified			1	2	3	7	4		30	1		5		53
Ether, stronger			1	2	4	6	4		30	1		5		53
Glycerin	18	4			1					1				24
Iodoform						7								7
Iron, tinct. chloride of		4		2			4							10
Lime-water		1					1	1						3
Saffron (Crocus)		4			2			10	15	1	7			39
Santonin						2		10						12
Sulphur, precipitated					1	6		10	14	1	5		2	39
Sulphur, washed			1		3			2	27			14		47
Totals	18	16	3	8	17	28	16	44	131	7	12	24	2	326

METHODS OF ANALYSIS.

As none but pharmacopœial articles have been selected for examination and the standard of quality prescribed therein is the legal standard to which articles included in the United States Pharmacopœia must conform, the pharmacopœial tests and analytical methods have been generally followed. Exhaustive analyses were not often necessary, but in most cases at least one quantitative determination was made. Substances of a complex nature containing important constituents for which no entirely satisfactory method of assay has been devised, have not been collected for examination but some such preparations will hereafter be studied as time permits.

SUMMARY OF RESULTS

Of the 326 samples examined there were classed as of:

		Per cent.
Good quality	140 or	43.0
Fair quality	44 or	13.5
Inferior quality	79 or	24.2
Not as called for	63 or	19.3

The above percentages by no means represent the proportions of good, bad and indifferent drugs on the market and on sale at the stores since only those articles which were considered likely to be adulterated or known to be frequently of inferior quality were collected. Had samples of drugs and pharmaceutical preparations been selected at random the proportion of pure and good articles would have been very much larger. This inquiry has not been conducted for the purpose of determining the percentage of inferior drugs actually sold but with a view to awakening in dealers a sense of greater carefulness and informing them of the provisions of law governing the sale of their commodities.

The comparatively large percentage of substituted articles, or articles wrongly sold, as shown above, is largely due to the considerable number of samples of saffron collected for which common safflower was generally sold in place of the real saffron or *crocus* of the U. S. P., which was called for specifically and in writing, as particularly stated further on. The following were the articles examined:

ACETIC ACID.—(*Acidum Aceticum, U. S. P.)*

Two samples examined, Nos. 546 and 548, both of which were of fair quality. The U. S. P. requires 36 per cent of absolute acetic acid. These contained 32.4 and 31.2 per cent respectively.

DILUTED ACETIC ACID.—(*Acidum Aceticum Dilutum, U. S. P.)*

Thirty-four samples examined, of which Nos. 662, 670, 671, 757 and 794 were of good quality; Nos. 661, 664, 666, 753, 754, 755, 756, 759, 760 and 808 were of fair quality; Nos. 659, 663, 667, 669, 673, 758, 761, 762, 763, 791, 793, 807, 819 and 822 were of inferior quality, and Nos. 660, 665, 668, 672 and 820 were not as called for, being of excessive strength. Of these latter, two (Nos. 660 and 672) consisted of acetic acid, *not diluted*, of fair strength, and the three others (Nos. 665, 668 and 820) were evidently most carelessly prepared without regard to strength. There were, therefore, of good quality 5; fair, 10; inferior, 14; and not as called for, 5. The U. S. P. requires 6 per cent of absolute acetic acid, and these varied from 1.9 to 35.1 per cent. Rejecting the five samples of excessive strength, the average percentage in the remaining 29 samples was 4.5 per cent. While it is not to be expected that such preparations will be made with scientific precision, this is too low an average, and samples containing but 2 and 3 per cent indicate great carelessness or indifference on the part of the seller. This acid is employed in the preparation of the solution of acetate of ammonium (spirit of mindererus), and if it is of inferior or excessive strength this solution will be much too weak or too strong, either of which conditions is decidedly objectionable. The percentage of absolute acetic acid in the 34 samples examined was as follows:

Absolute Acetic Acid.

	Per cent.
No. 659	3.8
No. 660	31.5
No. 661	5.1
No. 662	6.1
No. 663	3.4
No. 664	5.2
No. 665	18.0
No. 666	4.8
No. 667	4.3
No. 668	12.7
No. 669	3.3
No. 670	5.5
No. 671	7.0
No. 672	35.1
No. 673	3.9
No. 753	4.5
No. 754	4.5
No. 755	4.9
No. 756	4.7
No. 757	6.2
No. 758	3.6
No. 759	5.3
No. 760	4.5
No. 761	3.2
No. 762	3.7
No. 763	1.9
No. 791	3.7
No. 793	3.8
No. 794	7.0

	Per cent.
No. 807	3.0
No. 808	4.6
No. 819	4.4
No. 820	9.2
No. 822	4.2

CALOMEL.—(*Hydrargyri Chloridum Mite, U. S. P.*)

Three samples examined, Nos. 564, 565 and 566, all of good quality. Examination included tests for mercuric chloride (corrosive sublimate), ammoniated mercury, etc.

PURIFIED CHLOROFORM.—(*Chloroformum Purificatum, U. S. P.*)

Fifty-three samples examined of which Nos. 531, 532, 534, 535, 536, 538, 539, 540, 543, 545, 550, 555, 557, 559, 603, 605, 609, 611, 645, 646, 648, 649, 650, 651, 652, 653, 654, 657, 658, 715, 716, 717, 718, 719, 720, 721, 803, 813 and 814 were of good quality; Nos. 533, 537, 541, 542, 544, 552, 607, 647, 656, and 804 were of fair quality and Nos. 644, 655, 811 and 812 were of inferior quality. Therefore of good quality, 39; fair, 10, and inferior, 4. The U. S. P. requires a specific gravity of 1.485–1.490 at 15 degrees C. (59 degrees F.) The specific gravities of the 53 samples examined were as follows:

	Spec. grav.
No. 531	1.490
No. 532	1.484
No. 533	1.478
No. 534	1.489
No. 535	1.489
No. 536	1.488
No. 537	1.479
No. 538	1.489
No. 539	1.489
No. 540	1.490
No. 541	1.482
No. 542	1.477
No. 543	1.488
No. 544	1.481
No. 545	1.488
No. 550	1.490
No. 552	1.476
No. 555	1.490
No. 557	1.491
No. 559	1.483

	Spec. grav.
No. 603	1.490
No. 605	1.488
No. 607	1.488
No. 609	1.481
No. 611	1.488
No. 644	1.484
No. 645	1.486
No. 646	1.487
No. 647	1.474
No. 648	1.486
No. 649	1.488
No. 650	1.484
No. 651	1.487
No. 652	1.486
No. 653	1.487
No. 654	1.487
No. 655	1.486
No. 656	1.476
No. 657	1.487
No. 658	1.487
No. 715	1.484
No. 716	1.492
No. 717	1.488
No. 718	1.487
No. 719	1.487
No. 720	1.489
No. 721	1.487
No. 803	1.488
No. 804	1.471
No. 811	1.438
No. 812	1.485
No. 813	1.488
No. 814	1.489

STRONGER ETHER.—(*Aether Fortior, U. S. P.*)

Fifty-three samples examined of which Nos. 517, 519, 520, 522, 530, 551, 560, 604, 606, 610, 629, 635, 637, 638, 640, 641, 724, 725, 727, and 818 were of good quality; Nos. 521, 558, 633, 643 and 722 were of fair quality and Nos. 516, 518, 523, 524, 525, 526, 527, 528, 529, 553, 554, 608, 612, 630, 631, 632, 634, 636, 639, 642, 726, 805, 806, 815, 816 and 817 were of inferior quality, while two were not as called for, one of these (No. 556) consisting of spirit of nitrous ether and the other (No. 723) of the so-called "concentrated nitrous ether." Of these the first was dispensed unlabeled and the second was labeled "U. S. P. Stronge (sic) Ether" by the seller. Such errors as these are the grossest of blunders and the consequence of such ignorant or careless sales might be most serious to the purchaser. There were therefore of good quality, 20; fair, 5; inferior, 26; and not as called for, 2. This is not a good showing. Stronger ether being generally used as an anæsthetic ought to be of good quality, but from these results it will be seen that an inferior article is often, indeed in the majority of cases, offered for sale. Stronger ether having been called for in writing in each case the substitution of common ether is entirely inexcusable and shows great carelessness or ignorance. The U. S. P. requires a specific gravity not higher than 0.725 at 15 degrees C. (59 degrees F.) The specific gravities of the 53 samples examined omitting the 2 not ether (the gravities of which were 0.860 and 0.900) were as follows:

	Spec. grav.
No. 516	0.762
No. 517	0.724
No. 518	0.747
No. 519	0.725
No. 520	0.723
No. 521	0.730
No. 522	0.724
No. 523	0.760
No. 524	0.746
No. 525	0.755
No. 526	0.750
No. 527	0.743
No. 528	0.748
No. 529	0.762
No. 530	0.724
No. 551	0.727
No. 553	0.757
No. 554	0.749
No. 558	0.726
No. 560	0.727
No. 604	0.724
No. 606	0.728
No. 608	0.751
No. 610	0.725
No. 612	0.752

	Spec. grav.
No. 629	0.237
No. 630	0.751
No. 631	0.757
No. 632	0.748
No. 633	0.724
No. 634	0.760
No. 635	0.729
No. 636	0.757
No. 637	0.725
No. 638	0.724
No. 639	0.796
No. 640	....
No. 641	0.723
No. 642	0.765
No. 643	0.730
No. 722	0.730
No. 724	0.723
No. 725	0.725
No. 726	0.748
No. 727	0.723
No. 805	0.759
No. 806	0.754
No. 815	0.749
No. 816	0.750
No. 817	0.750
No. 818	0.724

GLYCERIN—(*Glycerinum, U. S. P.*)

Twenty-four samples examined, of which Nos. 547, 549, 574, 576, 577, 578, 579, 580, 581, 582, 583, 585, 587, 588, 589, 590, 795, 796, 797 and 798 were of good quality, and Nos. 573, 575, 584 and 586 of fair quality. There were therefore of good quality, 20, and of fair quality, 4. Examination included tests for acidity, sugars, acrylic, sulphuric, hydrochloric and oxalic acids, iron, calcium salts, etc. Some of the samples had a slightly acid reaction, and showed traces of impurities, but no gross adulteration was detected in any of them.

IODOFORM—(*Iodoformum, U. S. P.*)

Seven samples examined, of which Nos. 728, 729, 730, 731, 732 and 733 were of good quality, and No. 734 was of fair quality. Therefore, of good quality, 6, and of fair quality, 1. Examination included reaction, solubility in ether, presence of iodides, etc.

TINCTURE OF CHLORIDE OF IRON — (*Tinctura Ferri Chloridi, U. S. P.*)

Ten samples examined of which Nos. 799 and 826 were of good quality and conformed to the pharmacopœial requirements, and Nos. 800, 801, 802, 809, 810, 823, 824 and 825 were of fair quality, containing traces of the oxychloride, ferrous salt, or both, but not in sufficient quantity to materially affect their quality. Therefore, of good quality, 2, and of fair quality, 8.

LIME WATER — (*Liquor Calcis, U. S. P.*)

Three samples examined, of which Nos. 785 and 792 were of good quality, and No. 821 of fair quality. Therefore, of good quality, 2, and of fair quality, 1.

SAFFRON — (*Crocus, U. S. P.*)

Thirty-nine samples examined, of which 37 were spurious, consisting of "safflower" (*Carthamus tinctorius*), and but two were real saffron (stigmas of *Crocus sativus*), and these not of the best quality and reported as fair. The spurious samples were numbered as follows: Nos. 561, 562, 563, 591, 592, 593, 594, 595, 596, 597, 700, 701, 703, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 787, 788, 789 and 790, and the samples consisting of real saffron, of fair quality, were Nos. 702 and 704. Therefore, spurious, 37, and fair quality, 2. The practice of selling safflower, often used as a domestic remedy, for real saffron, is very common, and is, perhaps, warranted when the article is called for without a prescription, but when it is called for in writing and its officinal name given, the substitution of a substance not recognized by the pharmacopœia is entirely inexcusable, and shows great carelessness or ignorance on the part of the seller. Attention was called to this too common practice in my last annual report, and although the substitution may not be deemed of great importance, it is, nevertheless, desirable to correct such careless errors in dispensing drugs, and this result can best be accomplished by notifying those dealers who fall into this or similar errors, of their mistake. If the pharmacist does not keep real saffron in stock, as some do not on account of its high price, he should so state, and if safflower is offered in its stead it should be explained to the purchaser that it is not the article demanded, but a common substitute therefor, but in none of the above cases was such explanation made.

SANTONIN — (*Sontoninum, U. S. P.*)

Twelve samples examined, Nos. 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751 and 752, all of which were of good quality.

PRECIPITATED SULPHUR.—(*Sulphur Præcipitatum, U. S. P.*)

Thirty-nine samples of which Nos. 600, 686, 688, 689, 690, 692, 695, 697, 699, 736, 764 and 767 were pure and of good quality; No. 687 was of fair quality, having a slightly acid reaction; No. 571, 598, 599, 601, 602, 624, 625, 691, 693, 735, 738, 739, 740, 765, 766, 769, 770, 771, 772 and 774 were of inferior quality, containing large quantities of sulphate of lime and Nos. 572, 737, 773, 694, 696 and 698 were not as called for, the first three consisting of washed sulphur and the last three of common flowers of sulphur (sublimed sulphur). There were therefore of good quality, 12; fair quality, 1; inferior quality, 20, and not as called for, 6. The sale of common *lac sulphur* for the officinal precipated sulphur is entirely inexcusable. It is loaded with sulphate of lime and since precipitated sulphur of good quality is easily obtainable in the market at a slightly higher price, this substitution ought never to be made, but the above examination shows that the proper article was sold in but one-third the cases. Pharmacists ought to be familiar with the various grades of the medicinal articles in which they deal and a good result well be accomplished if, by calling attention to errors of this kind, an improvement in this respect can be brought about. The tests by which genuine precipitated sulphur of good quality can be distinguished from the impure commercial article are laid down in the pharmacopœia and are easily applied by the retailer.

WASHED SULPHUR.—(*Sulphur Lotum, U. S. P.*)

Forty-seven samples examined, of which Nos. 501, 510, 512, 568, 569, 613, 614, 615, 616, 618, 619, 620, 623, 626, 628, 676, 677, 684 and 786, were of good quality; Nos. 502, 504, 505, 506, 515, 570, 617, 621, 674, 678, 679, 680, 681, 683 and 685 were of inferior quality and the following were reported not as called for: Nos. 503, 507, 508, 509, 513, 514, 675 and 682 which consisted of precipitated sulphur of good quality, and Nos. 511, 567, 622, 627 and 768 which consisted of precipitated sulphur of inferior quality. These thirteen samples were sold through ignorance or carelessness for washed sulphur which was called for in writing. There were, therefore, of good quality 19; inferior quality, 15, and not called for 13.

As stated in my last annual report, washed sulphur was selected for examination, not because it is a very important drug, but because the substitution of the common unwashed flowers of sulphur for it is a very common practice. Washed sulphur has the natural acidity of the sublimed sulphur, removed by proper treatment with water of ammonia and subsequent washing, and being an article easily prepared by the pharmacist or obtained from reliable wholesale dealers or manufacturers, there is no reason why an impure article or a different one should be substituted for it.

During the period covered by this report, 22 samples of drinking water have been analyzed for the Board or for local boards of health. No samples of kerosene oil have been submitted for test. Opinions have been given on various chemical questions that have arisen from time to time. Nineteen samples of drugs and food articles have been collected for the other analysts at their request, and 86 samples received from their collectors, acting under my instructions.

It is proposed to continue the work during the coming year on about the same general plan as heretofore. New localities will be visited and further samples obtained from dealers whose goods have been found to be of inferior quality that it may be seen whether the warnings of the Board have received proper attention. That the work done during the past two years has had a decided effect in improving the quality of the drugs sold throughout the State, there can be no doubt, and if manufacturers, dealers and others interested will coöperate with the Board in the efforts it is making to raise the standard of the drugs and medicinal preparations now upon the market, the desired end can be attained without interfering with any legitimate business industry, or embarrassing dealers by a too rigid or oppressive enforcement of the law.

All of which is respectfully submitted.

WILLIS G. TUCKER,
Analyst.

CHEMICAL LABORATORY OF THE ALBANY MEDICAL COLLEGE, ALBANY, N. Y.,
November 25, 1887.

REPORT

OF

S. A. LATTIMORE, Public Analyst.

ROCHESTER, N. Y., *December* 31, 1887.

DR. LEWIS BALCH, *Secretary New York State Board of Health, Albany, N. Y.*:

DEAR SIR.— The duty of making chemical analyses of food articles, of potable waters, and of testing kerosene oil having been assigned to me by the New York State Board of Health, I have to report to you that during the part of the past year in which I have been thus occupied, I have received samples for examination from the following cities and villages: Albany, Attica, Binghamton, Batavia, Hudson, Middletown, Newburgh, Poughkeepsie, Rochester, Schenectady, Sing Sing, Troy, Yonkers.

The following statement exhibits the kinds and qualities of the articles analyzed:

	Number of samples.	
	Unadulterated.	Adulterated.
Allspice	1	..
Cassia	1	..
Cinnamon	1	..
Coffee	1	..
Cream tartar	7	41
Ginger	1	..
Pepper (black)	1	3
Pepper (white)	..	2
Tea	1	..

Kerosene oil at or above legal standard	5
Kerosene oil below legal standard	1

As much attention as possible has been given to the manufacturing processes employed in the preparation, on the large scale, of food articles, in order to ascertain whether, either accidentally or by design of the manufacturers or dealers, they were liable to be injured in nutritive value or contaminated with deleterious substances. In the great majority of cases it has been found that care and intelligence are exercised, and as the amount of capital required to maintain such a business with profit is very considerable, the proprietors fully appreciate the importance of securing a high reputation for the excellence and purity of their products.

The fact that the State exercises a supervision over such matters is doubtless not without a silent but salutary influence. Not unfrequently does the manufacturer seek the official examination of his goods, feeling that in case of any undeserved reflection on the quality of his products, he always has at hand an impartial tribunal to which he may appeal.

In a general way it may be said that, aside from a sense of honor and conscientious scruples, the intelligent manufacturer of the more important food articles has no motive to adulterate or deteriorate their value. It is likewise gratifying to know that purchasers are becoming steadily more critical and discriminating in their selections — a fact which no one so quickly recognizes as the manufacturer.

In the preparation of such staple articles as the breadstuffs, canned fruits, sugar, etc., all industries of vast and increasing magnitude, the manufacturers are constantly applying greater skill and intelligence with the most gratifying results.

As illustrating the more critical habits of consumers, it may be stated that of late years complaints are occasionally made concerning the blue color noticed in granulated sugar, which, on solution, leaves a slight deposit of a deep, blue color, which excites alarm. This coloring matter I have found in all cases brought to my attention to be the common well known blue pigment, *ultra marine.* Its addition to sugar is an old device of the manufacturer to disguise the yellow hue due to insufficient purification, on the same principle as the use of a blue tint in the laundry. The *ultra marine* thus added is necessarily in very minute quantity on account of its intense color, and as it is insoluble in water, it is, of course, harmless.

It is, however, in the minor food articles, which are far more costly, but are consumed in smaller quantities, that adulteration is chiefly practiced. The chief reasons for this, beside the relatively high cost of the raw material, are that as the necessary machinery is inexpensive, the manufacture is often carried on in the small way, and the very common practice of selling such goods to retail dealers in bulk destroys all means of tracing them to the manufacturer who makes no effort to establish a reputation, and who even attempts to palliate his dishonest practices by the claim that the substitutes which he employs are harmless, and that he is compelled to pursue such a course because his competitors do. These remarks apply to such articles as

CREAM TARTAR.

The observations contained in my report of last year, as to the almost universal adulteration of this article, or rather the complete substitution of other and cheaper substances for it, without any indication of that fact in the trade name, are seemingly as true now as then. The variety of these mixtures is remarkable. Cream tartar being a finely ground white powder of decidedly acid taste, it is possible to add to it other tasteless or acid white powders, without the possibility of detection of the fraud by any one but a chemist. As cream tartar, owing to its limited source of supply, is necessarily costly, while terra alba, starch, and superphosphate of lime are very cheap, the dishonest manufacturer is under strong temptation to increase his profits by the surreptitious and liberal addition of such articles.

I must again call attention to the very common fraud of selling superposphate of lime under the name of cream tartar. This article is cheaply made by treating burned bones with sulphuric acid, producing thereby a white powder of acid taste containing nearly equal proportions of sulphate of lime and phosphate of lime, and when used in the manufacture of commercial fertilizers known as "superphosphate of lime," it is generally sold without the slightest admixture of cream tartar. The extent to which the adulteration of this article is practiced is indicated by the following statement:

Composition.	Number of samples.
Cream tartar, unadulterated	7
Cream tartar and starch	3
Cream tartar and terra alba	2
Cream tartar, terra alba and starch	5
Cream tartar, superphosphate of lime and starch	1
Tartaric acid and starch	1
Tartaric acid and terra alba	6
Tartaric acid, terra alba and starch	3
Superphosphate of lime	10
Superphosphate of lime and starch	9
Alum and starch	1

SPICES.

While many manufacturers send out, under their own names, ground spices free from all foreign substances, and of excellent quality, and find an increasing appreciation of their goods, yet the markets are still flooded with articles of poor quality originally and largely mixed with any convenient rubbish which can be manipulated into the semblance of the genuine article. Fortunately for the victimized purchaser, the substitutes commonly added by the dishonest spice-grinder, however unsuited for food, and often repulsive in character, are not positively poisonous.

KEROSENE OIL.

The law prescribing the quality of kerosene oil is still violated in some places. In one case, an oil having a flashing point 20 degrees below the legal standard of 100° F., was sold to be used for illumination, the purchasers, and possibly the seller, being totally ignorant of the imminent danger to property and life involved in its use.

Very respectfully.

S. A. LATTIMORE.

REPORT

OF

G. C. CALDWELL, Public Analyst.

ITHACA, *October* 31, 1887.

DR. LEWIS BALOH, *Secretary State Board of Health:*

SIR.—I submit herewith, in tabular form, my report of assays of alkaloidal preparations made since my last report of December 14. No work was done during the months of July, August and September, owing to the lapse of the appropriations for this purpose.

For the methods of assaying preparations of quinia, I may refer to the last report, above referred to. Being satisfied as to the reliability of the "solution method," the "dry method" was not used this year.

For the assay of morphine pills, the following method was used, after giving it a thorough trial with the best German sulphate of morphine. The sulphate of morphine is extracted from the pills by means of alcohol of about 66 per cent; the salt is freely soluble in alcohol of this strength, apparently as much so as in water, while the excipient which forms so large a proportion of the pill in many cases does not, as it does with water, swell up to a gelatinous mass, from which it is very difficult to wash out the last portion of the sulphate. A quantity of the pills supposed to contain 12.5 grains of the morphia salt is treated with several portions of this alcohol, 5 or 6 drops of dilute sulphuric acid being added to the first portion; each portion is decanted off from the insoluble residue, and this residue is finally transferred to a filter and washed with alcohol till a drop of the washings, evaporated to dryness on a watch-glass no longer gives the nitric acid reaction for morphine. The several portions of the extract and the washings are evaporated down, over a water-bath, almost to dryness in order to remove all the alcohol; the residue is taken up with water, and the solution is filtered into a small-weighed Erlenmeyer flask; the filtrate and washings are concentrated in this flask to a certain volume about 30 cubic centimetres, and the weight of the solution is then ascertained; two weighed portions of it are taken for the assay. These are put in small glass-stoppered Erlenmeyer flasks, about six-tenths of a cubic centimetre of 10 per cent ammonia are added to each portion, the solutions are then vigorously shaken for 4 or 5 minutes, and allowed to stand from 12 to 24 hours. The precipitates of morphia are collected on filters previously dried at 100° C. and weighed, each filter being partly balanced by a companion filter, which is likewise dried at 100° and put on the weight pan, and through which the filtrate from the precipitate is passed. Both the filter with the precipitate and its companion are washed with small quantities of water saturated with morphia, 18 and 15 cubic centimetres respectively, and dried at 100°; in weighing, the companion filter is of course put on the weight pan again.

The quantity of ammonia used for the precipitation of the morphia is carefully adjusted, as above described, for the reason that the precipitate is notably soluble in this reagent; when tests were made with solutions of the sulphate, a satisfactory approximation to the theoretical quantity of morphia, and closely agreeing results, could be obtained only when just ammonia enough was added to make the solution alkaline.

No advantage was gained by using ether, as in the final precipitation of morphia in the assay of opium. If the solution is properly concentrated before the precipitation, and excess of ammonia is carefully avoided, the filtrate from the precipitate gives no more of a reaction for morphia, with concentrated nitric acid on the residue from the evaporation of a drop of it, than does the saturated morphia water, and the results of duplicate analyses usually agree very well.

Assayed by this method, which appears to give every fair advantage to the dealer and manufacturer, but few of the morphine pills sold come fully up to the standard; many fall so little short of it that the deficiency is perhaps of small account, when referred to a single pill, while a few cases of very serious deficiency have been detected.

With reference to the quinine preparations, the quality appears on the whole to be somewhat better than last year; but many instances will be found, in the tabular exhibit of results that follows, of important deficiencies, and a few gross frauds are shown up. The citrate of iron and quinine is often much below the standard called for in the U. S. Pharmacopœia, 12 per cent of quinine, and the quality of the sulphate quinine used in its manufacture is usually poor.

Druggists, who have been warned to cease selling certain brands of alkaloidal preparations, that have been found to be seriously deficient in quality, complain that they do not know where to go for their supplies, especially since houses of wide reputation not infrequently send out such deficient goods; and it appears to them that the Board of Health should go at once to the wholesale dealers with its warnings. This is evidently impracticable, for many reasons, and is not in accordance with the law as it stands. If goods that are found to be of inferior quality are returned at once to the wholesale dealers, with a statement of the grounds for such action, these dealers will soon learn that it is for their own interest to sell at least in this State only such preparations as are fully up to the standard, and even a little above rather than below it; and those who habitually or usually sell goods of low quality will be forced to abandon the field.

Respectfully submitted.

G. C. CALDWELL,

Public Analyst.

SULPHATE OF QUININE.

Number of sample.	HISTORY OF THE SAMPLE.				Excess of foreign alkaloids, as indicated by Kerner's test.
	Date of collection.	Of whom purchased.	Where purchased.	Said to be put up by.	
	1886.				
107...	November 15	Ingraham Bros.	Elmira	Rosengarten Sons	Some excess.
109...	November 15	J. F. Van Nort, Jr.	Elmira	Powers & Weightman	Very slight.
114...	November 16	J. L. Everitt	Elmira	Lehn & Fink	Some excess.
117...	November 15	S. D. Wadhams	Elmira	McKesson & Robbins	Much.
124...	November 15	Bartholomew & Smith	Elmira	Tarrent & Co.	Slight.
126...	November 15	J. Stewart Hill	Elmira	Keasbey & Mattison	Some excess.
142...	December 30	R. W. Graves & Co.	Rochester	Chinni Fabrik, Braunschweig, Germany	Much.
146...	December 30	S. A. Newman	Rochester	Bohringer & Sons	Much.
147...	December 30	S. A. Newman	Rochester	McKesson & Robbins	Much.
159...	December 30	A. C. Buck & Co.	Rochester	Keasbey & Mattison	None.
169...	December 30	Ballard & Hurlbut	Rochester	Powers & Weightman	None.
	1887.				
194...	May 6	H. L. Adams	Auburn	Powers & Weightman	Some excess.
200...	May 7	C. H. Sager	Auburn	McKesson & Robbins	Slight.
219...	June 10	John H. Sheehan	Utica	Powers & Weightman	Some excess.

CITRATE OF IRON AND QUININE.

Number of the sample.	HISTORY OF THE SAMPLE.				ASSAY.		Contains excess of foreign alkaloids, as indicated by Kerner's test.
	Date of collection.	Of whom purchased.	Where purchased.	Said to be put up by.	Per cent of quinine found.		
					I.	II.	
	1886.						
112...	November 15	R. S. Gilkeson	Elmira	Billings, Clapp & Co	11.30	11.32	Very much.
115...	November 15	T. S. Flood	Elmira	Lazell, Dally & Co	10.01	10.01	Much.
118...	November 15	S. D. Wadhams	Elmira	McKesson & Robbins	9.79	9.82	Much.
135...	December 30	A. R. Mandeville	Rochester	E. R. Squibb	11.13	11.31	Some excess.
	1887.						
178...	April 9	Gauntlett & Brooks	Ithaca		10.97	11.01	Much.
189...	April 11	Haskin & Todd	Ithaca	McKesson & Robbins	8.63	8.62	Much.
192...	May 6	M. L. Walley & Co	Auburn	Lazell, Dally & Co	9.38	9.41	
201...	May 7	G. H. Burt	Auburn	W. H. Schieffelin & Co	9.63	9.69	Much.
202...	May 7	L. Hunt	Auburn	Tarrant & Co	9.34	9.35	None.
205...	May 7	A. H. Hamilton	Auburn	Charles Pfizer	6.69	6.72	Much.
210...	May 7	C. H. Buttler	Oswego	E. R. Squibb	11.42	11.26	None.
212...	May 7	E. W. Austen	Oswego	McKesson & Robbins	10.38	10.38	None.
213...	May 7	D. M. Mead	Oswego	Billings, Clapp & Co	3.08	3.22	Much.
218...	June 10	J. H. Sheehan & Co	Utica	Powers & Weightman	11.81	11.82	Much.
222...	June 10	J. W. Cone	Utica	McKesson & Robbins	7.98	7.98	Much.
224...	June 10	W. Blaikie	Utica	C. T. White & Co	9.31	9.33	Much.

PILLS OF SULPHATE OF QUININE.

Number of sample.	HISTORY OF THE SAMPLE.				GRAINS, PER 100 PILLS, OF CRYSTALLIZED SULPHATE OF QUINIA.			Contains excess of foreign alkaloids, as indicated by Kerner's test.
	Date of collection.	Of whom purchased.	Where purchased.	Said to be put up by.	Claimed.	Estimated from quinia found on analysis.		
	1886.							
104...	November 15..	Ingraham Brothers	Elmira	W. H. Schieffelin & Co	200	157.9	157.9	None.
113...	November 16..	J. L. Everitt	Elmira	Lehn & Fink	200	156.4	159.5	Much.
119...	November 15..	S. D. Wadhams	Elmira	J. E. Moore	300	216.8	218.	Much.
120...	November 16..	Joseph Meyer, Jr	Elmira	Keasbey & Mattison	100	91.	91.4	None.
121...	November 16..	Bartholomew & Smith	Elmira	Parke, Davis & Co	100	93.4	93.7	None.
122...	November 15..	Bartholomew & Smith	Elmira	A. E. Gould & Co	200	160.1	168.6	Much.
127...	November 15..	Gerity Brothers	Elmira	W. S. Merrell Chemical Co	300	224.2	224.1	None.
131...	December 30..	J. & J. Cooper	Rochester	J. & J. Cooper	500	454.8	457.8	Slight.
133...	December 30..	Czar Dunning	Rochester	Czar Dunning	200	214.1	214.8	Some excess.
134...	December 30..	A. R. Mandeville	Rochester	A. R. Mandeville	100	88.3	89.2	None.
136...	December 30..	H. Fellman	Rochester	H. Fellman	300	293.5	297.7	None.
138...	December 30..	Dake Brothers	Rochester	Dake Brothers	300	254.7	255.6	Much.
139...	December 30..	J. A. Begg & Co	Rochester	J. A. Begg & Co	300	291.	290.3	Much.
140...	December 30..	J. M. Schmitt	Rochester	J. M. Schmitt	300	302.4	302.9	Some.
144...	December 30..	S. A. Newman	Rochester	S. A. Newman	300	318.3	310.9	Much.
148...	December 30..	G. H. Haass	Rochester	G. H. Haass	200	190.2	188.1	....
149...	December 30..	J. K. Post & Co	Rochester	W. R. Warner & Co	300	290.9	294.9	None.
151...	December 30..	J. K. Post & Co	Rochester	Parke, Davis & Co	200	176.2	174.2	Much.
152...	December 30..	Curran & Goler	Rochester	Curran & Goler	300	287.1	285.9	None.
155...	December 30..	Curran & Goler	Rochester	Wyeth Brothers	200	193.2	194.9	None.
156...	December 30..	C. F. Paine & Co	Rochester	Parke, Davis & Co	200	195.6	195.8	Slight.
157...	December 30..	J. Esterheld	Rochester	J. Esterheld	300	297.9	297.3	Slight.
158...	December 30..	A. Niederpruen	Rochester	A. Niederpruen	300	308.3	306.6	Some excess.
160...	December 30..	A. H. Dewey	Rochester	A. H. Dewey	300	265.1	265.9	None.
161...	December 30..	L. Klinzing	Rochester	L. Klinzing	300	274.3	271.6	None.
162...	December 30..	F. L. Zimmerman	Rochester	F. L. Zimmerman	300	294.3	294.6	None.
163...	December 30..	A. N. Braman	Rochester	A. N. Braman	200	198.9	196.9	None.
164...	December 30..	R. W. Chambers & Co	Rochester	R. W. Chambers & Co	200	136.2	135.3	None.
165...	December 30..	N. Barrowclough	Rochester	N. Barrowclough	300	151.8	158.7	None.
166...	December 30..	Haskin & Smith	Rochester	Haskin & Smith	300	267.6	267.1	None.
167...	December 30..	Ballard & Hurlbut	Rochester	Keasbey & Mattison	300	294.1	293.1	None.
	1887.							
170...	April 2..	Sager & Jennings	Cortland	J. E. Moore	200	175.2	173.8	None.
171...	April 2..	Sager & Jennings	Cortland	Wyeth & Brother	200	197.3	197.4	None.
177...	April 2..	C. A. Watson	Homer	H. Thayer & Co	50	66.14	67.8	None.

179...	April	9..	G. W. Schuyler	Ithaca	Upjohn Pill and Granule Co	300	287.1	283.1	Some excess.
180...	April	9..	White & Burdick	Ithaca	Fraser & Lea	200.	187.1	185.5	Much.
181...	April	11..	White & Burdick	Ithaca	W. S. Merrill Chemical Co	200	147.5	148.1	Some excess.
182...	April	9..	White & Burdick	Ithaca	McKesson & Robbins	*500	477.2	480.2	Much.
187...	April	9..	Atwater & Kellogg	Homer	Tilden & Co	100	89.85	88.54	Much.
188...	April	11..	Haskin & Todd	Ithaca	McKesson & Robbins	200	185.4	187.4	None.
191...	April	11..	G. W. Schuyler	Ithaca	W. H. Schieffelin	500	490.0	495.6	None.
195...	May	6..	W. A. Dean	Auburn	Thayer & Co	200	184.5	186.3	Some excess.
197...	May	6..	Atwater & Kellogg	Homer	Bullock & Crenshaw	200	193.2	193.6	Some excess.
199...	May	6..	M. L. Walley & Co	Auburn	Sharpe & Dohme	300	277.4	277.8	None.
203...	May	7..	A. H. Hamilton	Auburn	A. H. Hamilton	200	193.5	....	....
207...	May	7..	Osborn Brothers	Auburn	Parke, Davis & Co	300	249.1	248.2	Some excess.
209...	May	7..	C. H. Butler	Oswego	Upjohn Pill and Granule Co	300	301.7	301.5	Some excess.
214...	May	7..	Battes' drug store	Oswego	McKesson & Robbins	300	304.4	304.9	None.
215...	May	12..	White & Burdick	Ithaca	Upjohn Pill and Granule Co	200	199.6	199.2	None.
216...	May	12..	White & Burdick	Ithaca	Royal Chemical Co., Albany	200	39.79	38.79	....
217...	June	10..	Luce & Plumb	Utica	H. Thayer & Co	300	251.8	251.4	None.
220...	June	10..	Knowlson, druggist	Utica	W. H. Schieffelin & Co	200	182.3	176.6	Some.
221...	June	10..	J. W. Cone	Utica	J. W. Cone	300	304.5	304.	Much.
226...	June	10..	G. L. Hill	Utica	McKesson & Robbins	200	200.9	201.4	None.
227...	June	10..	G. O. Pennock	Utica	L. J. Finch	300	295.2	296.6	None.
228...	June	10..	Lake & Coon	Utica	E. Lilly	500	455.7	451.7	None.
229...	June	10..	W. Howarth	Utica	J. E. Moore	200	160.	156.7	Some.
231...	June	10..	Howarth & Ballard	Utica	Keasbey & Mattison	300	280.5	284.7	None.

*Bisulphate of quinine.

PILLS OF SULPHATE OF MORPHINE.

Number of the sample.	HISTORY OF THE SAMPLE.				GRAINS, PER 100 PILLS, OF CRYSTALLIZED SULPHATE OF MORPHIA.		
	Date of collection.	Of whom purchased.	Where purchased.	Said to be put up by.	Claimed.	Estimated from morphia found on analysis.	
						Assay I.	Assay II.
	1886.						
132...	December 30	J. & J. Cooper	Rochester	W. R. Warner & Co.	25	23.07	23.14
137...	December 30	H. Fellman	Rochester	J. E. Moore	25	24.48	24.28
141...	December 30	J. M. Schmitt	Rochester	McKesson & Robbins	25	22.26	21.92
143...	December 30	Dake Brothers	Rochester	Dake Brothers	25	10.85	10.25
145...	December 30	S. A. Newman	Rochester	Henry Thayer & Co.	25	20.9	21.14
150...	December 30	J. K. Post & Co.	Rochester	Keasbey & Mattison	12.5	10.98	10.94
153...	December 30	Curran & Goler	Rochester	W. H. Schieffelin & Co	25	16.42	16.66
168...	December 30	Ballard & Hurlbut	Rochester	Parke, Davis & Co.	25	23.56	23.33
	1887.						
172...	April 2	Sager & Jennings	Cortland	J. E. Moore	12.5	9.86	9.84
173...	April 2	Sager & Jennings	Cortland	W. H. Schieffelin & Co	25	23.05	23.23
174...	April 2	Brown & Maybury	Cortland	Parke, Davis & Co	25	21.97	21.81
175...	April 2	Sager & Jennings	Cortland	G. E. Burrows	25	24.31	23.09
183...	April 11	White & Burdick	Ithaca	Tilden & Co	25	18.31	18.49
184...	April 11	White & Burdick	Ithaca	W. S. Merrell Chemical Co.	25	20.56	19.94
190...	April 9	Atwater & Kellogg	Homer	Bullock & Crenshaw	25	20.95	21.04
193...	May 6	F. S. Smith	Auburn	J. E. Moore	25	18.96	18.81
196...	May 6	W. A. Dean	Auburn	McKesson & Robbins	25	22.57	22.85
198...	May 6	M. L. Walley & Co.	Auburn	Sharpe & Dohme	12.5	11.09	11.12
204...	May 7	A. H. Hamilton	Auburn	Keasbey & Mattison	25	20.41	20.06
206...	May 7	J. L. Elliott	Auburn	F. Stearns & Co.	12.5	8.12	8.30
208...	May 7	Osborne Brothers	Auburn	H. Thayer & Co.	25	21.27	21.39
211...	May 7	E. N. Austen	Oswego	L. J. Finch	25	21.04	20.95
223...	June 10	W. Blaikie	Utica	Fraser & Co.	25	20.57	20.64
226...	June 10	G. L. Hill	Utica	W. R. Warner & Co.	25	22.96	23.15
230...	June 10	Howarth & Ballard	Utica	Keasbey & Mattison	25	20.13	20.09
232...	June 10	Howarth & Ballard	Utica	Parke, Davis & Co.	12.5	11.02	10.97
233...	June 10	F. T. Ray & Co.	Utica	W. H. Schieffelin & Co.	12.5	12.18	12.43
234...	June 10	O. D. Bassett	Rome	McKesson & Robbins	12.5	11.53	11.28

MONTHLY BULLETINS.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	5,353	......	2,261	42.2	25	..	35	43	19
NEW YORK CITY	*1,481,929	3,507	28.26	1,520	43.4	20	0	28	25	10
BROOKLYN	*690,000	1,391	24.20	601	43.8	0	0	4	16	9
Gravesend	*5,000	3	7.20	0	....	0	0	0	0	0
Flatlands	3,127	5	19.80	1	20.0	0	0	0	0	0
New Utrecht	4,742	10	25.32	7	70.0	0	0	0	0	0
LONG ISLAND CITY	*21,000	36	20.57	15	41.6	0	0	0	0	0
Newtown	*10,000	14	16.80	6	42.8	1	0	0	0	0
Oyster Bay	*12,000	25	25.00	6	24.0	0	0	0	0	0
Flushing	16,000	27	20.25	5	18.6	0	0	1	0	0
North Hempstead	8,000	15	22.50	2	14.3	1	0	0	0	0
Huntington	8,098	16	23.70	3	18.7	0	0	0	0	0
Babylon	4,739	4	10.13	0	...	0	0	1	0	0
Southold	7,267	6	10.00	1	16.7	0	0	0	1	0
Sag Harbor	*3,000	2	8.00	0	....	0	0	0	0	0
Edgewater	*10,000	17	20.40	7	41.2	1	0	0	1	0
Northfield	7,014	12	20.57	2	16.6	0	0	0	0	0
Westfield	*7,000	8	13.70	2	25.0	0	0	0	0	0
YONKERS	*26,000	47	21.70	17	36.2	0	0	0	0	0
Westchester	*6,900	11	19.13	6	54.6	0	0	0	0	0
Mount Vernon	*8,000	11	16.50	7	63.6	1	0	0	0	0
Sing Sing	*6,500	13	24.00	9	69.2	0	0	0	0	0
New Rochelle	5,500	10	21.82	1	10.0	0	0	0	0	0
Rest of District	....	163	......	43	21.5	1	0	1	2	0
HUDSON VALLEY DIST.:										
Totals	....	759	......	196	25.8	23	..	14	9	2
ALBANY	*96,000	155	18.75	35	23.3	1	0	6	2	2
West Troy	*13,000	22	20.30	7	31.8	0	0	0	0	0
Hoosick Falls	*6,000	11	22.00	5	45.5	0	0	0	0	0
TROY	*65,000	132	24.36	39	29.7	13	0	1	0	0
Lansingburgh	*9,700	23	28.45	4	17.4	3	0	8	0	0
Green Island	*5,000	4	9.60	2	50.0	1	0	0	0	0
Greenbush	*7,200	13	21.66	4	30.7	0	0	1	0	0
Coxsackie	4,000	4	12.00	1	25.0	0	0	0	0	0
Catskill	*4,600	7	18.26	2	28.6	2	0	0	0	0
HUDSON	*10,000	15	18.20	5	33.3	0	0	0	0	0
KINGSTON	*21,100	29	14.79	7	26.9	0	0	0	4	0
Rosendale	5,000	4	9.60	1	25.0	0	0	0	1	0
Marbletown	*4,000	7	21.00	4	42.8	0	0	0	0	0
Esopus	4,736	6	15.20	1	16.7	0	0	0	0	0
Saugerties	*4,000	10	30.00	1	10.0	0	0	0	0	0
POUGHKEEPSIE	*20,200	33	19.64	12	36.3	0	0	0	0	0
Fishkill	10,732	6	7.00	1	16.7	0	0	1	0	0
Wappinger Falls	5,000	7	16.80	3	42.8	0	0	0	0	0
NEWBURGH	*20,000	34	19.80	11	33.3	1	0	0	0	0
Port Jervis	*9,000	4	5.33	0	....	0	0	0	0	0
Middletown	*10,000	10	12.00	4	40.0	0	0	0	0	0
Goshen	4,387	6	16.41	0	....	0	0	0	0	0
Haverstraw	*7,000	5	8.57	3	60.0	0	0	0	0	0
Nyack	*5,000	15	36.00	6	40.0	0	0	1	0	0
Ramapo	5,000	8	19.20	1	12.5	0	1	0	0	0
Rest of District	....	192	......	38	19.0	2	0	1	2	0

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during January, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
77	344	17	53	284	63	180.00	1,137	765	44	234	286	271	448	114	141	313	640
46	293	12	32	147	47	190.00	698	522	29	128	194	151	261	82	103	229	450
18	44	5	15	111	13	168.22	345	182	13	84	69	84	143	23	23	34	156
0	0	0	0	0	0	......	0	0	0	0	1	1	0	0	0	0	1
0	0	0	0	0	0	......	2	1	0	1	0	0	1	0	0	0	0
5	0	0	0	1	0	600.00	2	0	0	0	0	1	0	0	0	0	1
1	1	0	0	2	1	138.88	11	2	0	1	2	1	3	1	2	4	4
0	0	0	0	3	0	285.71	5	2	0	0	0	2	0	0	0	0	1
1	0	0	0	0	0	40.00	4	4	0	2	1	2	5	0	0	4	2
1	0	0	0	4	0	222.22	5	3	0	3	4	0	3	0	0	3	0
0	2	0	0	0	0	200.00	1	2	0	1	0	4	3	0	0	1	0
0	0	0	0	2	0	125.00	0	3	0	0	2	4	2	0	0	2	1
0	0	0	0	0	0	250.00	2	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	1	333.33	0	0	0	0	0	1	1	0	0	2	0
0	0	0	0	0	0	......	0	0	0	0	1	1	0	0	0	0	0
0	0	0	0	2	0	235.30	5	0	1	1	0	1	2	2	0	1	2
0	1	0	0	0	0	83.33	2	4	0	1	0	0	2	0	0	1	1
0	0	0	0	0	0	......	3	1	0	0	3	1	0	0	0	0	0
0	0	0	0	6	0	127.66	14	6	1	2	2	2	6	1	3	3	1
0	0	0	1	1	0	181.81	2	1	0	0	0	1	1	1	1	0	2
0	0	0	0	1	0	181.81	2	1	0	1	0	1	0	0	0	0	4
0	0	0	0	1	0	76.98	7	2	0	0	0	2	0	0	0	1	0
0	0	0	0	9	0	......	0	3	0	1	0	0	1	0	1	4	0
5	3	0	5	3	1	116.58	29	26	0	8	6	11	14	4	8	23	15
6	....	3	5	38	4	136.84	119	110	13	37	18	64	112	16	26	98	44
1	0	1	0	4	0	106.67	28	30	1	9	2	16	26	5	4	5	12
0	0	0	0	5	0	229.09	3	2	2	2	1	3	3	0	0	0	1
0	0	0	0	1	1	181.81	3	1	0	2	0	2	0	0	0	0	1
0	0	0	1	16	0	236.36	22	20	5	3	3	12	20	1	3	7	5
0	0	0	0	0	0	260.87	4	6	0	1	2	2	2	0	0	0	0
0	0	0	0	0	0	250.00	1	0	0	0	0	0	0	0	1	1	0
0	0	0	0	0	0	71.00	3	2	0	1	1	0	1	0	2	2	0
0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	0	2	0
1	0	0	0	0	0	428.57	0	0	0	1	0	1	1	0	1	0	0
1	0	0	0	0	0	66.66	2	3	0	0	1	0	2	0	2	3	1
0	0	0	0	1	0	192.30	3	3	0	2	1	6	3	0	0	2	0
0	0	0	0	0	0	250.00	0	1	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	......	1	0	0	0	0	0	4	0	0	2	0
0	0	0	0	0	0	......	2	0	0	1	0	0	0	0	0	1	2
0	0	0	0	0	0	......	1	2	0	0	1	1	0	1	0	3	1
1	0	0	1	2	0	90.75	6	3	1	1	2	2	5	1	2	4	2
0	0	0	0	2	0	500.00	0	2	0	0	0	0	0	0	0	1	0
1	0	0	0	1	1	285.71	2	2	0	0	0	0	1	0	0	0	0
0	0	0	0	0	1	60.60	5	8	3	3	0	1	6	1	1	3	1
0	0	0	0	0	0	......	0	0	2	0	0	1	0	0	1	0	0
0	0	0	0	0	0	......	1	2	0	2	1	0	1	1	1	0	1
0	0	0	0	0	0	......	0	0	0	0	0	0	1	1	0	4	0
0	0	0	0	1	0	200.00	2	0	0	0	0	0	1	0	0	1	0
0	0	0	0	1	0	133.33	2	1	0	0	0	2	5	0	1	1	1
0	0	0	0	0	1	125.00	0	1	0	1	0	1	0	1	0	3	0
2	0	2	3	4	0	80.00	24	21	0	8	3	14	28	4	7	53	14

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals	....	229	......	46	20.0	3	....	1	1	....
Argyle	3,700	3	9.94	0	....	0	0	0	0	0
Greenwich	3,861	1	3.50	0	....	0	0	0	0	0
Salem	3,500	2	7.00	0	....	0	0	0	0	0
Fort Edward	4,880	7	17.21	3	42.8	0	0	0	1	0
Queensbury	10,000	14	16.80	5	35.7	0	0	0	0	0
Crown Point	4,287	2	5.60	0	....	0	0	0	0	0
Malone	7,918	4	6.26	0	....	0	0	0	0	0
OGDENSBURGH	11,000	15	16.36	0	....	1	0	0	0	0
Gouverneur	5,500	12	26.18	5	41.7	0	0	0	0	0
Ellisburgh	4,812	6	15.10	0	....	0	0	0	0	0
Plattsburgh	7,000	7	12.00	1	14.3	0	0	0	0	0
WATERTOWN	12,200	15	14.75	2	13.3	0	0	0	0	0
Cape Vincent	3,143	5	19.10	0	....	0	0	0	0	0
Rest of District	....	136	......	30	22.0	2	0	1	0	0
MOHAWK VALLEY DIST.:										
Totals	....	287	......	72	25.0	4	....	3	0	0
SCHENECTADY	15,000	22	17.60	9	40.9	0	0	0	0	0
Schoharie	8,350	7	25.00	2	28.6	0	0	1	0	0
Middleburgh	3,376	3	11.25	2	66.7	0	0	0	0	0
AMSTERDAM	*14,000	27	21.00	8	29.6	0	0	1	0	0
Johnstown	*6,000	7	14.00	3	42.8	0	0	0	0	0
Gloversville	*10,000	8	9.60	2	25.0	1	0	0	0	0
Little Falls	7,300	4	6.57	0	....	0	0	0	0	0
Ilion	4,200	2	6.00	0	....	0	0	0	0	0
UTICA	*39,000	72	22.15	17	23.6	0	0	0	0	0
ROME	12,045	22	22.00	5	22.8	0	0	0	0	0
Boonville	4,000	4	12.00	1	25.0	0	0	0	0	0
Camden	3,400	5	17.65	0	....	0	0	0	0	0
Waterford	4,326	6	16.53	3	50.0	0	0	0	0	0
Ballston Spa	3,200	4	15.00	0	....	0	0	0	0	0
Saratoga Springs	10,000	21	25.20	3	14.3	1	0	0	0	0
Rest of District	....	73	......	17	23.3	2	0	1	0	0
SOUTHERN TIER DIST.:										
Totals	....	201	......	53	26.5	5	....	4	2	....
BINGHAMTON	*23,000	30	15.65	13	43.3	0	0	0	0	0
Owego	6,000	18	36.00	2	11.1	2	0	1	0	0
Candor	4,323	4	11.10	0	....	0	0	0	0	0
Waverly	3,000	1	4.00	0	....	0	0	0	0	0
ELMIRA	*25,000	33	14.24	9	27.3	0	0	2	0	0
Horseheads	3,500	4	16.00	1	25.0	0	0	0	0	0
Bath	3,300	4	14.55	0	....	0	0	0	0	0
Olean	*8,000	13	19.50	8	61.5	1	0	1	0	0
JAMESTOWN	*12,000	16	16.00	7	43.7	1	0	0	0	0
Fredonia	2,800	3	12.92	0	....	0	0	0	0	0
Rest of District	....	75	......	13	17.3	1	0	0	2	0
EAST CENTRAL DIST.:										
Totals	....	310	......	59	19.0	....	....	5	3	....
Walton	3,541	2	7.00	0	....	0	0	0	0	0
Delhi	3,000	4	16.00	1	35.0	0	0	0	0	0
Cooperstown	*3,000	3	12.00	0	....	0	0	0	0	0
Oneonta	*5,000	10	24.00	2	20.0	0	0	0	0	0

JANUARY — *(Continued).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
3	1	4	1	12	....	109.17	27	28	3	12	4	16	20	9	10	46	28
0	0	0	0	0	0	......	0	0	0	0	1	1	1	0	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	1	0
0	0	0	0	0	0	142.85	1	0	0	0	1	0	0	0	0	1	3
1	1	0	0	0	0	142.87	2	2	2	0	0	2	0	0	0	2	2
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	1	0	0
0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	0	2	0
0	0	0	0	0	0	66.67	3	2	0	0	0	0	2	2	0	0	5
0	0	2	0	7	0	750.00	0	1	0	0	0	0	1	1	0	0	0
0	0	0	0	0	0	......	0	1	0	1	0	0	1	2	0	1	0
0	0	0	0	0	0	......	0	1	0	4	0	2	1	0	0	1	1
1	0	0	0	0	0	66.67	0	6	0	2	0	0	4	0	0	0	2
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	3	1
1	0	2	1	5	0	88.23	20	13	1	7	2	10	9	4	9	35	14
2	1	1	4	9	4	100.00	49	39	1	18	16	25	34	10	9	34	24
0	0	1	0	3	2	272.72	3	0	0	0	1	5	6	0	0	0	1
0	0	0	0	0	0	......	3	1	0	0	0	0	0	0	1	0	1
0	0	0	0	0	0	......	1	0	0	0	0	0	2	0	0	0	0
0	0	0	0	5	0	222.22	2	5	0	0	2	0	4	1	1	5	1
0	0	0	1	0	0	148.57	2	0	0	0	0	0	1	0	1	0	2
0	0	0	0	0	0	125.00	3	0	0	0	1	0	0	0	0	1	2
0	0	0	0	0	0	......	1	2	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	1	0	0
1	0	0	3	0	2	83.33	13	8	0	7	7	11	7	2	1	6	4
0	0	0	0	0	0	......	2	2	1	1	2	1	5	3	0	2	3
0	0	0	0	0	0	......	0	1	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	......	1	1	0	0	0	1	0	0	0	2	0
0	0	0	0	0	0	......	0	2	0	1	0	2	1	0	0	0	0
0	0	0	0	0	0	......	0	1	0	1	0	0	0	0	1	0	1
0	1	0	0	1	0	142.85	2	6	0	1	1	0	5	0	0	2	1
1	0	0	0	0	0	54.85	16	10	0	6	2	4	3	4	3	14	7
5	1	1	0	14	2	170.00	33	16	1	12	4	9	22	3	13	35	19
0	0	0	0	3	0	100.00	4	2	0	1	0	2	7	0	3	2	6
0	0	0	0	0	1	222.22	2	0	0	1	1	1	0	1	1	5	2
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	3	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	1	0	0	0
1	1	0	0	1	0	151.52	6	5	0	3	1	1	2	0	2	4	4
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	0	3
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	3	1
2	0	0	0	2	1	538.45	2	0	0	1	0	0	1	0	1	0	1
0	0	1	0	3	0	312.50	3	0	0	2	0	1	2	0	3	0	0
0	0	0	0	0	0	......	1	1	0	0	0	0	0	0	0	1	0
2	0	0	0	5	0	133.33	15	8	1	4	2	3	10	1	2	17	2
3	....	2	2	10	1	90.00	38	33	5	19	11	29	46	9	13	70	10
1	0	0	0	0	0	500.00	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	1	0	0	0	2	0
0	0	0	0	0	0	......	0	0	0	1	0	0	1	0	0	0	1
0	0	0	0	2	0	200.00	1	0	0	0	0	2	3	0	1	0	1

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.— *(Continued.)*										
Cazenovia	4,363	6	......	0	....	0	0	0	0	0
Canastota	2,500	4	19.20	3	75.0	0	0	0	0	0
Hamilton	3,912	3	9.23	0	....	0	0	0	0	0
Skaneateles	4,866	6	14.80	2	33.0	0	0	0	0	0
SYRACUSE	*70,000	84	14.40	23	27.3	0	0	3	2	0
Geddes	7,000	10	17.14	2	20.0	0	0	0	0	0
Cortland	7,361	13	21.19	0	....	0	0	0	0	0
Homer	3,000	3	12.00	2	33.3	0	0	0	0	0
Rest of District	....	162	......	25	15.6	0	0	2	1	0
WEST CENTRAL DIST.:										
Totals	....	195	......	35	18.0	....	....	3	....	....
AUBURN	*26,000	23	10.61	6	26.0	0	0	0	0	0
Groton	3,450	2	7.00	0	....	0	0	0	0	0
Ithaca	*10,000	13	15.60	4	30.7	0	0	0	0	0
Waterloo	*4,500	7	18.67	3	42.8	0	0	0	0	0
Hector	5,000	9	21.69	2	22.2	0	0	0	0	0
Seneca Falls	*6,852	7	12.26	1	14.3	0	0	0	0	0
Manchester	*4,000	7	21.00	4	57.1	0	0	0	0	0
Phelps	*7,000	6	10.29	1	16.7	0	0	0	0	0
Geneva	*6,000	14	28.00	4	28.6	0	0	0	0	0
Penn Yan	4,500	6	16.00	0	....	0	0	0	0	0
Rest of District	....	101	......	10	10.0	0	0	3	0	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	337	......	100	29.7	1	....	7	7	....
OSWEGO	*24,000	21	10.50	3	14.2	0	0	1	2	0
Richland	4,000	5	25.00	4	80.0	0	0	0	0	0
Fulton	*4,000	2	6.00	0	....	0	0	0	0	0
Clyde	3,000	2	8.00	1	50.0	0	0	0	0	0
Lyons	*6,000	8	16.00	2	25.0	0	0	0	0	0
Newark	*3,500	2	7.00	0	....	0	0	0	0	0
Palmyra	*4,800	6	15.00	0	....	0	0	0	0	0
Wolcott	3,753	2	6.40	1	50.0	1	0	0	0	0
ROCHESTER	*110,000	170	18.54	59	34.7	0	0	3	3	0
Greece	*5,000	4	9.60	0	....	0	0	0	0	0
Mendon	3,200	2	7.50	0	...	0	0	0	0	0
Brighton	3,736	5	16.25	3	60.0	0	0	0	0	0
LOCKPORT	*15,000	5	......	2	50.0	0	0	0	0	0
Aurora	*3,000	3	12.00	0	....	0	0	0	0	0
Rest of District	....	100	......	25	25.0	0	0	3	2	0
Totals for the State	....	7,671	......	2,822	....	61	0	72	65	21

REMARKS.—The total reported mortality for the month of January is 7,671; of which
deaths, a ratio of 162.91 per 1,000 total mortality. From diarrhœal diseases, the ratio per
consumption the ratio of mortality is 137.81 per 1,000 deaths, and 217.93 per 1,000 above
consumption and puerperal diseases is 310.00. From acute respiratory diseases there
has not been so low since the spring month of 1886; there is material falling off in the
entirely to the maritime district. There is a large death rate from acute respiratory
insertion) reports 376 deaths for five weeks ending January 29, of which 155 are infant

NOTE.—For boundaries of Sanitary Districts see Annual Summary.

JANUARY — (*Concluded*).

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	0	0	......	0	0	0	0	0	2	1	1	0	2	0
0	0	0	0	2	0	500.00	0	0	0	1	0	0	1	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	2	1	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	0	2	1	1	1	0
0	0	2	2	2	1	142.85	12	11	1	5	2	9	19	3	3	6	1
0	0	0	0	0	0	......	2	0	1	1	1	0	0	0	3	2	0
0	0	0	0	2	0	153.85	0	1	0	0	1	0	1	0	1	6	1
0	0	0	0	0	0	......	1	0	0	0	0	1	0	0	1	0	0
2	0	0	0	2	1	50.00	20	20	3	11	7	14	16	3	3	51	6
.....	....	1	2	5	1	60.00	17	30	1	8	10	18	25	5	5	46	18
0	0	0	0	2	0	87.00	3	5	0	0	2	1	5	1	0	0	4
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	1	0
0	0	1	0	0	0	77.00	1	1	0	1	2	0	2	0	1	4	0
0	0	0	0	0	0	......	0	1	0	1	0	1	2	0	0	1	1
0	0	0	0	1	0	111.11	3	0	0	0	0	0	2	0	1	0	1
0	0	0	0	0	0	......	1	3	0	0	0	0	1	0	0	2	0
0	0	0	0	2	0	285.71	1	0	0	0	0	0	3	0	0	1	0
0	0	0	0	0	0	......	0	0	0	1	1	1	0	0	1	1	1
0	0	0	1	0	1	142.86	4	2	0	0	0	1	0	0	2	1	2
0	0	0	0	0	0	......	0	0	0	0	0	1	2	1	0	2	0
0	0	0	1	0	0	40.00	4	17	1	5	5	13	8	3	0	32	9
5	....	1	....	34	2	170.00	37	36	3	21	16	21	47	12	7	51	29
0	0	0	0	2	0	238.10	1	5	0	0	2	3	3	1	0	0	1
0	0	0	0	0	0	......	2	0	0	0	1	1	1	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	1	0
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	1	0	0
0	0	0	0	0	0	......	2	2	0	0	2	1	1	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	0	0	0
0	0	0	0	1	0	166.67	0	0	1	0	0	0	0	0	1	3	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	0
4	0	0	0	28	0	223.53	20	19	0	13	8	7	31	7	1	12	14
0	0	0	0	0	0	......	0	3	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	2	400.00	0	0	0	1	0	0	0	0	0	1	1
1	0	0	0	0	0	......	0	1	0	1	0	0	0	0	0	0	2
0	0	0	0	0	0	......	0	0	0	0	1	0	1	0	0	0	1
0	0	1	0	0	0	90.00	12	6	2	6	1	9	8	4	3	30	10
101	347	30	67	406	78	......	1,454	1,057	72	361	365	453	754	178	224	693	812

36.8 per cent were under the age of five years. From zymotic diseases there were 1,248
1,000 deaths is 10.16; from typhoid fever, 9.38; from croup and diphtheria, 52.93. From
the age of five years. The combined death ratio per 1,000 from zymotic diseases,
were 189.56 death per 1,000 total mortality. The relative mortality from zymotic diseases
death rate from diphtheria; the considerable mortality from measles is confined almost
diseases. For December 350 delayed returns have been received. Buffalo (too late for
mortality and 75 from zymotic diseases, making total mortality for the State 8,047.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals............	....	4,428	......	1,874	42.3	15	..	19	38	20
NEW YORK CITY............	*1.481,920	2,969	26.04	1,293	43.6	12	0	13	22	15
BROOKLYN	*690,000	1,162	21.89	490	42.1	0	0	6	12	5
Gravesend................	*5,000	8	19.20	2	25.0	0	0	0	0	0
Flatlands................	3,127	5	19.18	0	....	0	0	0	0	0
New Utrecht..............	4,742	5	12.65	1	20.0	0	0	0	0	0
Newtown	*10,000	23	27.60	10	43.5	0	0	0	0	0
Oyster Bay	*12,000	15	15.00	4	26.7	0	0	0	0	0
Hempstead	18,160	20	13.32	7	35.0	0	0	0	0	0
North Hempstead.........	7,000	7	12.00	2	28.6	0	0	0	0	0
Huntington..............	8,098	9	10.00	2	22.2	0	0	0	0	0
Brookhaven	*5,000	12	28.80	4	33.3	0	0	0	0	0
Southold.................	7,267	9	15.00	0	....	0	0	0	1	0
Riverhead	*4,000	5	15.00	2	40.0	0	0	0	0	0
Edgewater..............	*10,000	18	21.60	4	22.2	0	0	0	0	0
Northfield	7,014	6	10.28	3	50.0	0	0	0	2	0
Westfield	*7,000	5	8.57	4	80.0	0	0	0	0	0
YONKERS	*26,000	44	20.31	14	31.8	0	0	0	0	0
Westchester..............	*6,900	6	10.45	2	33.3	0	0	0	0	0
Sing Sing..............	*6,500	13	24.00	4	30.7	0	0	0	0	0
New Rochelle.............	*5,500	9	19.64	3	33.3	1	0	0	0	0
Rest of District	....	78	......	23	37.5	1	0	0	1	0
HUDSON VALLEY DIST.:										
Totals...................	....	687	......	182	26.5	13	...	24	4	1
ALBANY	*96,000	155	19.38	40	32.2	2	0	7	1	1
West Troy..............	*13,000	16	14.10	3	18.8	0	0	1	0	0
Hoosick Falls..........	*6,000	9	18.00	4	44.5	0	0	0	0	0
TROY.....................	*65,000	85	15.70	30	37.5	8	0	3	0	0
Lansingburgh	*9,700	26	32.16	5	19.2	0	0	2	0	0
Green Island...........	*5,000	4	9.60	2	50.0	1	0	0	0	0
Greenbush..............	*7,200	6	10.00	1	16.7	0	0	0	0	0
Coxsackie	4,000	8	24.00	2	25.0	0	0	0	0	0
Catskill...............	*4,600	7	17.78	2	28.6	0	0	0	0	0
HUDSON...................	*9,000	18	24.00	5	27.8	0	0	0	2	0
KINGSTON	*21,100	21	12.00	8	38.1	0	0	0	0	0
Wawarsing................	8,547	3	4.22	1	33.3	0	0	0	0	0
Rosendale................	5,000	8	19.20	5	62.5	0	0	0	0	0
Marbletown	*4,000	2	6.00	0	....	0	0	0	0	0
Esopus...................	4,736	6	15.20	3	50.0	0	0	0	0	0
Saugerties..	*4,000	5	15.00	2	40.0	1	0	0	0	0
POUGHKEEPSIE	*20,200	27	16 20	4	14.7	0	0	0	0	0
Fishkill.................	10,732	15	16.77	3	20.0	0	0	0	0	0
Wappinger Falls........	5,000	3	7.20	1	33.3	0	0	0	0	0
NEWBURGH	*20,000	28	16.80	7	25.0	0	0	0	1	0
Port Jervis	*9,000	7	9.33	1	14.3	0	0	1	0	0
Middletown.............	*10,000	9	10.80	5	55.5	0	0	0	0	0
Goshen	4,387	5	13.64	2	40.0	1	0	0	0	0
Haverstraw	*7,000	2	3.43	0	....	0	0	0	0	0
Nyack..................	*5,000	6	14.50	3	50.0	0	0	0	0	0
Ramapo...................	5,000	10	24.00	3	30.0	0	0	0	0	0
Rest of District	....	196	......	40	20.0	0	0	10	0	0

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns during February, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
66	226	21	20	342	60	209.25	842	638	55	210	278	278	457	76	124	257	386
41	181	11	11	263	50	208.42	538	438	37	138	202	188	277	49	90	206	187
23	38	8	3	75	8	153.18	244	154	14	48	66	71	151	22	21	20	173
0	0	0	0	0	0	......	1	1	0	2	0	0	1	1	0	0	1
0	0	0	0	0	0	......	1	1	0	1	0	2	0	0	0	0	0
0	0	0	0	0	0	......	3	0	1	0	0	0	0	0	0	1	0
0	1	1	0	0	0	130.43	7	2	1	1	0	0	4	1	1	0	3
0	3	0	0	0	0	133.34	6	2	0	3	0	1	0	0	0	0	1
1	2	0	0	1	0	200.00	2	2	1	2	0	1	0	0	3	2	3
0	0	0	0	0	0	......	2	0	0	0	0	1	2	0	0	1	1
0	0	0	0	0	0	......	2	1	0	0	0	1	1	0	0	4	0
1	0	0	1	0	0	166.67	0	2	0	0	1	0	0	0	0	3	4
0	0	1	0	0	0	222.22	0	4	0	1	0	1	0	0	0	1	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	1	0	3
0	0	0	0	0	0	......	4	1	0	5	0	4	1	0	0	2	1
0	0	0	0	0	0	333.33	1	0	0	0	1	0	1	0	0	0	1
0	0	0	0	1	1	400.00	2	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	1	22.73	7	12	1	1	4	2	9	1	2	3	1
0	1	0	0	0	0	166.67	2	0	0	1	0	0	1	0	0	1	0
0	0	0	0	0	0	......	4	4	0	1	0	1	2	0	0	1	0
0	0	0	0	1	0	222.22	1	0	0	0	1	0	1	0	1	2	1
0	1	0	5	1	0	225.00	14	14	0	5	3	5	6	2	4	10	6
5	1	3	6	24	5	125.18	92	112	13	48	22	59	67	14	16	91	67
0	0	0	3	4	2	161.29	22	32	3	5	7	24	15	4	1	1	21
0	0	0	0	2	0	187.85	1	1	1	1	1	4	1	0	0	2	1
0	0	0	1	2	0	333.33	2	1	0	0	1	0	0	0	0	1	1
0	0	1	0	3	0	187.75	12	13	0	9	4	4	11	0	1	5	11
0	0	0	0	1	0	115.40	5	3	1	0	3	4	4	0	0	1	2
0	0	0	0	0	0	250.00	0	2	0	0	0	0	0	0	0	1	0
0	0	0	0	0	1	166.67	0	0	0	1	0	2	2	0	0	0	0
0	0	0	0	0	0	......	2	0	0	1	1	0	1	1	2	0	0
0	0	0	0	0	0	......	2	2	0	0	0	3	0	0	0	0	0
1	0	0	1	0	0	222.22	1	4	1	4	0	0	0	1	0	2	1
0	0	0	0	2	0	95.24	2	2	2	1	0	3	4	1	1	3	0
0	0	0	0	0	0	......	1	1	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	2	0	0	1	0	0	1	0	1	0	3
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	1	0	1	0	0	0	0	1	0	1	2
0	0	0	0	0	0	200.00	1	1	0	0	0	0	1	0	0	0	1
0	0	0	0	0	0	......	5	7	2	1	0	0	1	1	2	6	2
0	0	0	0	4	0	263 33	1	2	0	1	0	2	0	1	0	2	2
0	0	0	0	0	0	......	1	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	1	71.43	5	5	0	5	0	2	5	1	1	1	1
0	0	0	0	0	0	142.85	0	3	0	0	0	1	0	0	1	0	1
0	0	0	0	0	0	......	4	1	0	2	0	0	1	0	0	0	1
0	0	0	0	0	0	200·00	1	1	0	0	0	0	0	1	0	1	0
0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	0	0	0
0	1	0	0	0	0	166.67	3	1	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	......	2	1	0	1	0	1	0	0	1	2	2
4	0	2	1	6	1	120.00	15	27	1	15	5	7	20	2	5	60	15

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals	....	227	......	56	24.7	4	..	1	..	....
Argyle	3,700	5	16.22	0	....	0	0	0	0	0
Greenwich	3,861	7	21.76	3	42.8	0	0	0	0	0
Fort Ann	4,267	4	11.25	0	....	0	0	0	0	0
Fort Edward	4,880	8	19.67	3	37.5	0	0	0	0	0
Queensbury	10,000	17	20.40	3	17.7	0	0	0	0	0
Crown Point	4,287	3	8.40	1	33.3	0	0	0	0	0
Malone	7,918	8	12.15	3	37.5	0	0	0	0	0
OGDENSBURGH	11,000	15	16.37	3	20.0	1	0	0	0	0
Gouverneur	5,500	12	26.18	4	33.3	2	0	0	0	0
Ellisburgh	4,812	7	17.45	3	42.8	0	0	0	0	0
Plattsburgh	7,000	6	10.30	2	33.3	0	0	0	0	0
Cape Vincent	3,143	2	8.00	1	50.0	0	0	0	0	0
Rest of District	....	133	......	30	22.5	1	0	1	0	0
MOHAWK VALLEY DIST.:										
Totals	....	307	......	78	26.0	1	..	2	..	....
SCHENECTADY	15,000	22	17.60	4	18.1	0	0	0	0	0
Schoharie	3,350	3	10.75	0	....	0	0	0	0	0
Cobleskill	3,371	2	8.00	0	....	0	0	0	0	0
Middleburgh	3,376	3	10.65	1	33.3	0	0	0	0	0
AMSTERDAM	14,000	17	14.57	7	41.2	0	0	0	0	0
Johnstown	*6,000	7	14.00	1	14.3	0	0	0	0	0
Gloversville	*10,000	8	9.60	2	25.0	0	0	0	0	0
Little Falls	7,300	4	6.58	0	....	0	0	0	0	0
Ilion	4,200	6	14.76	0	....	0	0	0	0	0
UTICA	*39,000	62	19.10	14	22.6	0	0	1	0	0
ROME	12,045	15	15.00	3	20.0	0	0	0	0	0
Boonville	4,000	2	6.00	0	....	0	0	0	0	0
Camden	3,400	3	10.60	1	33.3	1	0	0	0	0
Waterford	4,326	7	19.42	3	42.8	0	0	0	0	0
Ballston Spa	3,200	4	15.00	2	50.0	0	0	0	0	0
Saratoga Springs	10,000	22	29.40	7	31.8	0	0	0	0	0
Rest of District	....	120	......	33	27.5	0	0	1	0	0
SOUTHERN TIER DIST.:										
Totals	....	172	......	46	26.7	5	....	2	1	....
BINGHAMTON	*23,000	37	19.30	17	46.0	1	0	0	0	0
Owego	6,000	6	12.00	1	16.6	0	0	0	0	0
Candor	4,323	2	5.75	0	...	0	0	0	0	0
ELMIRA	*25,000	23	11.04	6	26.0	2	0	2	0	0
Bath	3,500	6	20.58	3	50.0	0	0	0	0	0
Olean	*8,000	10	15.00	4	40.0	0	0	0	0	0
JAMESTOWN	*12,000	10	10.00	2	20.0	0	0	0	0	0
Westfield	3,000	3	12.00	1	33.3	0	0	0	0	0
Rest of District	....	75	......	12	11.7	2	0	0	1	0
EAST CENTRAL DIST.:										
Totals	....	265	......	59	29.0	....	....	1	1	....
Walton	3,541	2	6.75	0	....	0	0	0	0	0
Delhi	3,090	5	20.00	1	20.0	0	0	9	0	0
Cooperstown	*3,000	5	20.00	3	60.0	0	0	0	0	0
Oneonta	*5,000	8	19.20	2	25.0	0	0	0	0	0
Cazenovia	4,363	3	8.25	0	...	0	0	0	0	0
Oneida	5,000	6	14.40	1	16.7	0	0	0	0	0
Brookfield	3,685	4	13.00	0	....	0	0	0	0	0

FEBRUARY — *(Continued).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
2	2	1	4	10	2	114.53	31	32	1	12	9	15	18	7	12	44	20
0	0	0	0	0	0	......	2	0	0	0	1	1	0	0	0	1	0
1	0	0	0	0	0	142.85	1	1	0	0	0	1	1	0	0	1	1
0	0	0	0	0	0	......	1	1	0	0	1	0	0	0	0	1	0
1	0	0	0	0	0	125.00	2	2	0	0	0	0	1	0	0	2	0
0	2	0	0	0	0	117.60	3	2	0	1	2	4	2	1	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	0	1	0	0	0	1
0	0	0	0	0	0	......	1	0	0	0	1	0	2	0	1	2	1
0	0	0	0	2	0	200.00	1	4	0	1	0	0	0	0	1	2	3
0	0	0	0	2	0	333.33	1	0	0	0	0	0	1	1	2	1	2
0	0	0	0	0	0	......	1	1	0	0	0	0	2	0	0	3	0
0	0	1	0	1	0	333.33	0	0	0	0	0	0	0	1	1	1	1
0	0	0	0	0	0	......	1	0	0	1	0	0	0	0	0	0	0
0	0	0	4	5	2	100.00	16	21	1	9	4	9	8	4	7	30	11
2	3	....	6	5	5	80.00	41	52	3	13	14	23	38	11	12	45	31
0	0	0	0	0	0	......	2	3	0	1	2	5	4	0	1	0	4
0	0	0	0	0	0	......	0	2	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	1	0	0	0	0	1
0	0	0	0	2	0	117.68	6	1	0	2	0	0	1	1	0	0	4
0	0	0	0	0	0	......	2	2	0	0	0	1	0	0	0	1	1
0	0	0	0	0	0	......	0	1	0	1	0	2	1	2	1	0	0
0	0	0	0	0	0	......	0	2	1	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	2	0	0	1	0	1	1	1	0	0
1	0	0	3	0	2	112.50	8	14	2	1	2	3	14	2	2	3	4
0	0	0	0	1	0	66.66	2	1	0	1	0	0	1	0	3	5	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	1	142.85	1	2	0	1	0	0	0	0	0	0	2
0	0	0	9	0	0	......	0	1	0	2	0	0	1	0	0	0	0
0	3	0	0	1	1	227.27	2	4	0	0	0	1	2	1	1	5	1
1	0	0	3	1	1	53.33	17	17	0	4	9	10	10	4	3	30	9
1	2	....	....	8	....	111.78	23	20	7	12	2	9	19	3	8	37	13
1	1	0	0	6	0	243.24	3	3	4	4	0	3	7	0	0	2	2
0	0	0	0	0	0	......	1	0	0	0	0	0	0	1	0	4	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	1	0
0	0	0	0	1	0	217.38	5	4	1	0	0	1	3	0	1	2	1
0	0	0	0	0	0	......	0	0	1	1	0	0	1	0	0	2	1
0	0	0	0	0	0	......	1	3	0	1	0	0	0	0	1	0	4
0	0	0	0	0	0	......	2	1	0	1	0	3	1	1	1	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	2
0	1	0	0	1	0	83.33	10	9	1	5	2	2	7	1	5	25	3
1	....	1	1	6	1	60.00	46	28	4	21	15	20	25	13	10	55	16
0	0	0	0	0	0	......	0	6	0	1	0	0	0	0	0	0	1
0	0	0	0	0	0	......	2	0	0	0	0	0	0	0	0	2	1
0	0	0	0	0	0	......	2	0	1	0	1	0	1	0	0	0	0
0	0	0	0	0	1	125.00	2	0	0	2	1	0	1	0	0	0	1
0	0	0	0	0	0	......	0	0	0	0	0	0	1	1	1	0	0
0	0	0	0	0	0	......	0	0	0	0	2	0	0	0	2	1	1
0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	2	0

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.—(*Continued*).										
Canastota	2,500	2	9.60	1	50.0	0	0	0	0	0
Skaneatelas	4,866	8	19.60	1	12.5	0	0	0	0	0
SYRACUSE	*70,000	94	16.10	26	27.7	0	0	0	1	0
Homer	3,000	5	20.00	1	20.0	0	0	0	0	0
Rest of District	....	123	......	23	18.7	0	0	1	0	0
WEST CENTRAL DIST.: Totals	....	170	......	33	20.0	....	....	1	1	0
AUBURN	*26,000	28	12.92	6	21.4	0	0	1	1	0
Groton	3,450	5	17.39	1	20.0	0	0	0	0	0
Ithaca	*10,000	15	18.00	5	33.3	0	0	0	0	0
Waterloo	*4,500	3	8.00	1	33.3	0	0	0	0	0
Hector	5,000	2	4.80	0	....	0	0	0	0	0
Manchester	*4,000	1	3.00	0	....	0	0	0	0	0
Phelps	*7,000	6	10.28	1	16.7	0	0	0	0	0
Canandaigua	6,300	6	11.50	1	16.7	0	0	0	0	0
Geneva	*6,000	9	18.00	2	22.2	0	0	0	0	0
Attica	3,100	3	11.61	0	....	0	0	0	0	0
Penn Yan	4,500	7	18.68	1	14.3	0	0	0	0	0
Le Roy	*3,000	4	16.00	0	....	0	0	0	0	0
Rest of District	....	81	......	15	18.7	0	0	0	0	0
LAKE ONTARIO AND WESTERN DIST.: Totals	....	397	......	111	27.2	1	...	7	1	....
OSWEGO	*24,000	21	10.50	5	23.8	0	0	0	0	0
Richland	4,000	3	9.00	1	33.3	0	0	0	0	0
Fulton	*4,000	6	18.00	2	33.3	0	0	0	0	0
Clyde	3,000	4	16.00	2	50.0	0	0	0	0	0
Lyons	*6,000	8	16.00	3	42.5	0	0	0	1	0
Newark	*3,500	1	3.43	1	100.0	0	0	0	0	0
Palmyra	*4,800	7	17.50	0	....	0	0	0	0	0
Wolcott	3,753	6	19.20	2	33.3	0	0	0	0	0
ROCHESTER	*110,000	168	18.32	53	31.0	0	0	2	0	0
Brockport	*4,500	9	24.00	0	....	0	0	1	0	0
Mendon	3,200	1	4.00	1	100.0	0	0	0	0	0
Brighton	3,736	3	10.00	1	33.3	0	0	0	0	0
LOCKPORT	*15,000	6	......	0	....	0	0	0	0	0
Tonawanda	*4,900	4	9.88	3	75.0	0	0	0	0	0
Amherst	4,578	2	5.24	1	50.0	1	0	0	0	0
Rest of District	....	148	......	36	24.0	0	0	4	0	0
Totals for the State	....	6,653	......	2,439	....	39	0	57	46	21

REMARKS.—The total reported mortality for the month of February is 6,653; of which deaths, a ratio of 159.00 per 1,000 total mortality. From diarrhœal diseases, the ratio per consumption the ratio of mortality is 143.20 per 1,000 deaths, and 225.71 per 1,000 above the tion and puerperal diseases is 315.12. From acute respiratory diseases there were 172.00 Buffalo, Long Island City and Cohoes; in the last there were forty-one deaths in received.

NOTE.—For boundaries of Sanitary Districts. see Annual Summary.

FEBRUARY — *(Concluded).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	2	0	......	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0.	0	......	0	0	0	0	1	1	3	1	0	2	0
0	0	1	0	1	0	31.69	20	17	3	10	5	13	8	4	3	7	1
0	0	0	0	0	0	......	0	0	0	1	0	0	0	2	0	1	1
1	0	0	1	3	0	48.80	20	10	0	7	5	6	10	5	4	40	10
....	....	1	1	4	3	64.70	16	17	1	9	5	14	26	9	11	35	16
0	0	0	0	1	1	142.85	5	2	1	1	1	1	8	1	1	0	3
0	0	0	0	0	1	......	0	0	0	0	0	1	1	0	0	1	1
0	0	0	1	0	0	66.66	0	2	0	0	1	1	2	0	0	3	5
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	2	1	0	0	1	0	0	1	0	1	0
0	0	1	0	2	0	500.00	0	0	0	0	0	0	1	0	0	2	0
0	0	0	0	0	0	......	0	2	0	1	0	0	2	0	1	2	1
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	2	0	0
0	0	0	0	0	0	......	0	0	0	1	0	1	1	2	2	0	0
0	0	0	0	0	0	......	2	0	0	0	0	0	0	0	0	2	0
0	0	0	0	1	1	25 00	7	10	0	5	2	9	10	5	5	21	5
2	5	1	1	29	6	130.00	53	53	2	23	12	25	36	16	11	79	34
0	0	0	0	1	0	50.00	3	5	0	1	0	2	2	1	0	5	1
0	0	0	0	0	0	......	1	0	0	0	0	0	1	0	0	1	0
0	0	0	0	0	0	......	2	1	0	0	0	0	0	0	0	2	1
0	1	0	0	0	0	250.00	1	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	1	250.00	1	0	0	1	0	2	2	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	1	0	142.85	0	1	0	0	0	1	0	0	1	3	0
0	0	0	0	0	0	......	2	0	0	0	0	1	2	1	0	0	0
1	4	1	0	22	1	182.35	13	30	0	10	5	7	22	8	5	20	17
0	0	0	0	0	0	111.11	3	0	0	0	0	0	0	1	0	4	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	1	333.33	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	1	1	0	2	0	2	0	0	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	0	3
0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	1	0
1	0	0	1	5	3	93.30	25	15	2	9	7	10	6	5	5	40	10
79	239	28	39	423	87	......	1,144	952	86	348	357	443	686	149	204	643	583

36.8 per cent were under five years of age. From zymotic diseases there were 1,058
1,000 deaths is 13.08; from typhoid fever, 6.91; from croup and diphtheria, 63.58. From
age of five years. The combined death ratio per 1,000 from zymotic diseases, consump-
deaths per 1,000 total mortality. No report for the month has been sent by the cities of
January. Since the issue of the last bulletin 275 delayed returns for January have been

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	4,943	......	1,853	35.3	19	....	28	40	24
NEW YORK CITY	*1,481,920	3,247	26.15	1,285	39.6	17	0	21	25	10
BROOKLYN	*690,000	1,286	22.37	450	35.8	0	0	5	11	2
Gravesend	*5,000	9	21.60	4	44.5	0	0	0	0	0
Flatlands	3,127	4	16.00	0	....	0	0	0	0	0
New Utrecht	4,742	8	20.00	1	12.5	0	0	0	0	0
Newtown	*10,000	16	19.20	7	43.7	0	0	0	0	0
Oyster Bay	*12,000	16	16.00	5	31.3	0	0	0	1	0
North Hempstead	7,000	9	15.43	3	33.3	0	0	0	0	0
Huntington	8,098	11	16.30	2	18.2	0	0	0	1	0
Babylon	4,739	10	25.30	2	20.0	0	0	0	0	0
Southold	7,267	8	22.32	1	12,5	0	0	1	0	0
Riverhead	*4,000	4	12.00	2	50.0	0	0	0	0	0
Sag Harbor	*3,000	6	24.00	1	16.7	0	0	0	0	0
Edgewater	*10,000	18	21.60	8	44.4	1	0	0	1	0
Northfield	7,014	5	8.57	1	20.0	0	0	0	0	0
Westfield	*7,000	11	18.85	4	36.4	0	0	0	0	0
YONKERS	*26,000	45	20.75	12	26.7	0	0	0	0	0
Westchester	*6,900	15	25.71	6	40.0	0	0	0	0	0
Sing Sing	*6,500	14	25.84	7	50.0	0	0	0	0	0
New Rochelle	*5,500	12	26.18	2	16.6	0	0	0	0	0
Rest of District	....	189	......	50	26.3	1	0	1	1	12
HUDSON VALLEY DIST.:										
Totals	....	795	......	182	22.5	11	....	22	2	0
ALBANY	*96,000	144	17.75	33	22.9	1	0	3	0	0
COHOES	*20,000	41	24.60	16	39.0	0	0	4	0	0
West Troy	*13,000	17	15.68	6	35.3	0	0	1	0	0
Hoosick Falls	*6,000	10	20.00	2	20.0	0	0	0	0	0
TROY	*65,000	116	21.41	24	20.7	9	0	3	0	0
Lansingburgh	*9,700	21	25.97	6	28.5	0	0	1	0	0
Green Island	*5,000	5	12.00	5	100.0	0	0	0	0	0
Greenbush	*7,200	17	28.33	4	23.5	0	0	1	1	0
Coxsackie	4,000	6	18.00	2	33.3	1	0	0	0	0
Catskill	*4,600	11	28.70	0	....	0	0	1	0	0
HUDSON	*10,000	20	12.00	6	30.0	0	0	1	0	0
KINGSTON	*21,100	33	18.77	7	21.2	0	0	0	1	0
Wawarsing	8,555	2	......	0	....	0	0	0	0	0
Rosendale	5,000	8	19.20	4	50.0	0	0	0	0	0
Esopus	4,736	7	17.73	1	14.3	0	0	0	0	0
Saugerties	*4,000	7	21.00	2	28.5	0	0	0	0	0
POUGHKEEPSIE	*20,200	28	16.63	8	28.5	0	0	0	0	0
Fishkill	10,732	13	15.00	2	15.3	0	0	0	0	0
Wappinger Falls	5,000	5	12.00	3	60.0	0	0	0	0	0
Port Jervis	*10,000	14	16.80	1	7.2	0	0	0	0	0
Middletown	*10,000	12	14.40	4	33.3	0	0	0	0	0
Goshen	4,387	8	21.82	0	....	0	0	1	0	0
Haverstraw	*7,000	12	20.57	2	16.7	0	0	0	0	0
Nyack	*5,000	8	19.20	3	37.5	0	0	0	0	0
Ramapo	5,000	10	24.00	2	20.0	0	0	0	0	0
Rest of District	....	220	......	40	18.2	0	0	6	0	0

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during March, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the
of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
75	130	30	30	401	607	276.00	809	276	70	219	276	269	486	109	173	293	579
54	96	22	16	285	600	352.91	486	31	54	148	193	180	300	59	125	228	297
21	19	7	10	97	5	138.62	250	180	11	52	68	67	147	36	35	21	242
0	1	0	0	1	0	222.22	3	1	0	0	0	0	1	0	1	0	1
0	0	0	0	0	0	......	1	0	0	0	1	0	0	0	0	2	0
0	0	0	0	0	0	......	3	1	0	0	0	1	1	1	0	0	1
0	0	0	0	0	0	......	2	3	0	2	0	0	3	0	0	1	5
0	1	0	0	2	0	250.00	4	2	2	0	0	2	0	0	0	2	0
0	1	0	0	0	0	142.85	3	1	0	0	1	1	0	0	0	1	2
0	0	0	0	0	0	90.91	2	0	0	1	0	0	3	1	2	0	1
0	0	0	0	0	0	......	1	3	0	1	0	0	3	0	0	0	2
0	0	0	0	1	1	375.00	0	0	1	0	0	0	0	0	1	2	1
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	1	2
0	0	0	0	1	0	166.67	3	0	0	1	1	0	0	0	0	0	0
0	0	0	0	3	0	275.00	5	1	0	1	0	1	1	1	0	1	2
0	0	0	0	0	0	......	1	0	0	0	0	1	0	1	0	1	1
0	2	0	0	1	0	272.73	4	2	0	2	0	0	0	0	0	0	0
0	0	1	0	0	0	22.22	9	11	0	2	2	6	5	1	3	0	5
0	1	0	0	0	0	66.66	3	1	0	0	3	0	0	1	2	1	3
0	0	0	0	2	0	142.85	2	0	0	2	0	0	2	0	0	3	3
0	0	0	0	1	0	83.00	1	3	0	0	0	0	1	0	0	6	0
0	9	0	4	7	1	180.00	27	35	2	7	7	10	19	8	4	23	11
7	4	3	3	20	4	95.00	107	131	9	48	29	99	77	11	26	112	70
3	1	0	0	2	0	62.50	14	31	0	12	5	34	6	2	5	12	13
0	0	0	1	0	2	175.00	7	4	0	3	6	0	6	1	0	3	4
0	0	2	0	2	0	294.12	3	2	0	0	0	3	0	0	1	0	3
0	0	0	0	1	0	100.00	1	3	0	1	0	0	1	0	0	2	1
1	0	0	0	0	0	112.75	22	15	5	7	3	18	13	4	2	7	7
0	0	0	0	1	0	98.00	3	2	2	0	2	4	3	0	0	1	2
0	0	0	0	2	0	400.00	0	0	0	0	0	0	0	0	0	0	3
0	0	0	0	0	0	117 50	4	5	0	0	1	2	1	0	1	0	1
0	0	0	0	0	0	166.96	0	0	1	1	0	0	1	0	1	1	0
0	0	1	0	0	1	254.55	0	2	0	2	0	0	3	0	0	0	1
0	0	0	0	0	0	50.00	4	6	0	0	0	2	2	1	0	0	4
1	1	0	0	1	0	121.21	8	6	0	1	1	5	5	0	1	2	0
0	0	0	0	0	0	......	0	0	0	0	0	2	0	0	0	0	0
0	0	0	0	0	0	......	4	1	0	0	0	1	0	0	0	1	1
0	0	0	0	0	0	......	1	1	0	1	0	0	1	0	0	3	0
0	0	0	0	3	0	428.57	0	1	0	1	0	0	1	0	0	1	0
0	0	0	0	3	0	107.14	3	6	1	0	1	3	1	1	2	5	2
0	0	0	0	0	0	......	3	5	0	0	0	1	1	0	1	0	2
0	0	0	0	0	0	......	0	1	0	0	1	0	1	0	0	0	2
0	0	0	0	0	0	......	0	2	0	2	1	1	1	1	1	1	4
0	0	0	0	1	0	83.33	1	3	0	0	0	0	5	0	0	1	1
0	0	0	0	0	0	125.00	0	0	0	0	0	0	0	0	1	6	0
0	0	0	0	0	0	......	1	2	0	3	0	0	1	0	0	2	3
0	0	0	0	0	0	......	0	2	0	1	0	2	1	0	0	1	1
0	0	0	0	0	0	......	3	1	0	0	2	0	2	0	0	2	0
2	2	0	0	4	1	77.27	25	30	0	13	6	20	21	1	10	61	15

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals....................	....	271	......	61	22.5	3	....	2	2	....
Argyle	3,700	3	9.73	0	....	0	0	0	1	0
Greenwich..................	3,861	3	10.00	0	....	0	0	0	0	0
Salem	3,500	5	17.14	0	....	0	0	0	0	0
Fort Ann...................	4,267	1	3.00	0	....	0	0	0	0	0
Fort Edward	4,880	5	13.00	2	40.0	0	0	0	0	0
Queensbury	12,000	20	20.00	8	40.0	0	0	0	0	0
Crown Point................	4,287	4	11.20	1	25.0	0	0	0	0	0
Port Henry	2,525	1	6.00	0	....	0	0	0	0	0
Malone.....................	7,918	9	13.67	2	22.2	0	0	0	0	0
OGDENSBURG	11,000	21	22.90	5	23.8	1	0	0	0	0
Gouverneur	5,500	9	19.63	1	11.1	1	0	0	0	0
Ellisburgh.................	4,812	8	20.00	1	12.5	0	0	0	0	0
Plattsburgh	7,000	3	5.30	2	66.6	0	0	0	0	0
WATERTOWN	12,200	15	15.00	1	6.7	0	0	0	0	0
Cape Vincent...............	3,143	2	7.85	1	50.0	0	0	0	0	0
Rest of District...........	....	162	......	37	22.8	1	0	2	1	0
MOHAWK VALLEY DIST.:										
Totals.....................	....	378	......	77	20.0	4	....	5	....	....
SCHENECTADY................	15,000	32	25.60	9	28.1	1	0	2	0	0
Schoharie..................	3,350	4	14.33	1	25.0	0	0	0	0	0
Middleburgh................	3,376	5	17.80	2	40.0	0	0	0	0	0
AMSTERDAM	*14,000	24	20.57	7	29.0	0	0	2	0	0
Johnstown	*6,000	6	12.00	2	33.3	0	0	0	0	0
Gloversville	*10,000	11	13.20	3	31.0	0	0	0	0	0
Little Falls	7,300	6	10.00	0	....	0	0	0	0	0
Ilion......................	4,200	2	6.00	0	....	0	0	0	0	0
UTICA	*39,000	72	21.35	18	25.0	2	0	0	0	0
ROME.......................	12,045	20	20.00	2	10.0	0	0	0	0	0
Boonville	4,000	4	12.00	1	25.0	0	0	0	0	0
Camden.....................	3,400	6	21.18	1	16.7	0	0	0	0	0
Waterford	4,326	9	24.94	0	....	0	0	0	0	0
Ballston Spa	3,200	4	15.00	0	....	0	0	0	0	0
Saratoga Springs	10,000	23	27.60	6	26.0	0	0	0	0	0
Rest of District...........	....	150	......	25	16.7	1	0	1	0	0
SOUTHERN TIER DIST.:										
Totals.....................	....	215	......	53	24.6	....	....	1	2	....
BINGHAMTON	*23,000	47	24.52	18	38.3	0	0	0	1	0
Owego	6,000	7	14.00	2	28.5	0	0	0	0	0
Candor.....................	4,323	7	19.45	3	42.8	0	0	0	0	0
Waverly	3,000	2	8.00	0	....	0	0	0	0	0
ELMIRA	*25,000	32	15.36	7	21.8	0	0	0	0	0
Horseheads	3,500	2	7.00	0	....	0	0	0	0	0
Bath.......................	3,500	6	20.57	2	33.3	0	0	0	0	0
Olean......................	*8,000	10	15.00	4	40.0	0	0	0	0	0
JAMESTOWN..................	*12,000	21	20.00	6	30.0	0	0	0	0	0
Fredonia	2,800	1	4.50	1	100.0	0	0	0	0	0
Rest of District...........	....	80	......	10	12.5	0	0	1	1	0
EAST CENTRAL DIST.:										
Totals.....................	....	263	......	51	19.2	1	....	1	1	....
Walton	3,541	2	6.85	0	....	0	0	0	0	0
Delhi......................	3,000	2	8.00	0	....	0	0	0	0	0
Cooperstown	*3,000	2	8.00	0	....	0	0	0	0	0

MARCH — *(Continued).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
1	5	2	3	4	....	81.45	38	32	2	19	7	21	20	19	4	57	30
0	0	0	0	0	0	333.33	0	0	0	1	0	0	0	0	0	0	1
0	0	0	0	0	0	......	0	0	0	0	1	1	0	0	0	0	1
0	0	0	0	0	0	......	0	1	0	0	0	1	0	1	0	0	2
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	0
0	1	0	0	0	0	200.00	1	1	0	1	0	0	0	1	0	0	0
0	4	0	0	1	0	250.00	0	2	1	2	0	3	4	1	0	1	1
0	0	0	0	0	0	......	1	0	0	0	0	1	0	1	1	0	0
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	......	3	1	0	0	0	1	2	1	0	0	1
0	0	0	0	0	0	48.00	5	2	0	1	1	2	2	0	0	4	3
0	0	0	0	1	0	222.22	4	1	0	0	0	1	0	1	0	0	0
0	0	0	0	0	0	......	2	1	0	0	0	0	0	0	0	4	1
0	0	0	0	0	0	......	0	1	0	1	0	0	1	0	0	0	0
0	0	0	0	0	0	.....	1	2	0	3	0	1	0	1	1	6	0
0	0	0	0	0	0	......	1	0	0	0	1	0	0	0	0	0	0
1	0	2	3	2	0	75.00	20	20	1	10	4	9	11	12	2	41	20
1	3	....	...	9	....	58.00	48	42	6	22	14	34	44	17	10	70	49
0	0	0	0	1	0	125.00	2	5	1	2	1	3	7	2	0	2	3
0	0	0	0	0	0	......	0	0	0	1	0	0	1	0	0	1	1
0	0	0	0	0	0	......	1	0	0	1	0	2	0	0	0	0	1
0	0	0	0	1	0	122.22	4	2	0	1	2	1	2	0	0	5	4
0	0	0	0	1	0	166.67	0	1	1	1	0	0	0	0	0	2	0
0	0	0	0	1	0	90.91	1	0	0	0	0	3	1	1	1	1	2
0	0	0	0	0	0	......	0	0	0	0	0	1	2	1	1	1	0
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	1	0
0	1	0	0	0	0	41.67	10	10	1	5	2	7	16	3	1	5	0
0	0	0	0	0	0	......	2	2	0	2	1	3	2	2	0	5	1
0	0	0	0	0	0	......	0	1	0	0	0	0	0	1	1	1	0
0	0	0	0	0	0	......	1	0	1	1	0	1	1	0	0	1	0
0	0	0	0	0	0	.. ...	0	2	0	0	2	0	1	0	1	0	3
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	4	0
0	1	0	0	3	0	173.90	7	1	0	0	2	0	1	1	1	1	5
1	1	0	0	2	0	40.00	20	18	2	8	4	12	10	6	4	40	20
3	....	1	1	13	3	111.60	28	19	2	10	5	21	31	7	9	37	22
0	0	0	0	5	1	148.88	7	4	0	2	0	7	5	2	2	2	9
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	4	2
0	0	0	0	0	0	......	2	1	0	0	0	0	1	0	0	1	2
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	1	0	0
0	0	0	0	1	0	31.25	7	4	0	4	0	6	4	0	2	2	2
0	0	0	0	0	0	......	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	1	0	1	1	1	1	1
0	0	0	0	0	0	......	2	1	0	0	0	1	2	0	0	1	3
0	0	1	0	2	0	150.00	3	3	1	0	1	4	1	2	1	1	1
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	0	0
3	0	0	1	5	2	162.50	5	6	1	3	3	2	16	2	2	25	2
2	1	1	3	6	3	73.00	37	45	1	8	10	30	8	11	3	64	17
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	2	0	0	0	0	0

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.— *(Continued).*										
Oneonta	*5,000	7	16,80	2	28.7	0	0	0	0	0
Oneida	5,000	2	5.00	1	50.0	0	0	0	0	0
Skaneateles	4,866	2	5.00	0	....	1	0	0	0	0
SYRACUSE	*70,000	96	16.43	23	24.0	0	0	0	1	0
Homer	3,000	4	16.00	0	....	0	0	0	0	0
Rest of District	....	146	......	25	16.7	0	0	1	0	0
WEST CENTRAL DIST.:										
Totals	....	255	......	62	24.3	....	....	2	1	....
AUBURN	*26,000	36	16.50	18	50.0	0	0	1	0	0
Ithaca	*10,000	16	19.20	7	43.8	0	0	0	0	0
Waterloo	*4,500	5	13.34	0	....	0	0	0	0	0
Hector	5,000	6	14.40	0	....	0	0	0	0	0
Seneca Falls	6.852	10	17.50	6	....	0	0	0	0	0
Manchester	*4,000	1	3.00	0	....	0	0	0	0	0
Phelps	*7,000	8	13.71	1	12.5	0	0	0	0	0
Canandaigua	6,300	9	17.15	0	....	0	0	0	0	0
Geneva	*6,000	16	32.00	5	31.2	0	0	0	0	0
Le Roy	*3,000	6	24.00	0	....	0	0	0	0	0
Rest of District	... .	142	.....	25	10.5	0	0	1	1	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	710	......	212	30.0	4	....	11	6	....
OSWEGO	*24,000	36	18.00	11	30.5	0	0	0	0	0
Fulton	4,000	8	24.00	0	....	0	0	0	0	0
Clyde	3,000	6	24.00	1	16.6	0	0	0	0	0
Lyons	*6,000	14	28.00	3	21.5	0	0	0	1	0
Newark	*3,500	5	17.17	0	....	0	0	0	0	0
Palmyra	*4,800	9	22.50	0	....	0	0	1	0	0
Wolcott	3,753	3	9.50	0	....	0	0	0	0	0
ROCHESTER	*110,000	168	18.35	48	28.0	0	0	2	0	0
Brockport	*4,500	1	2.67	0	....	0	0	0	0	0
Brighton	3,736	6	19.50	0	....	0	0	0	0	0
Albion	*5,000	13	31.20	2	....	0	0	0	0	0
LOCKPORT	*15,000	4	......	1	25.0	0	0	0	0	0
BUFFALO	*202,818	282†	18.07	108	38.3	3	0	4	2	0
Tonawanda	*4,900	6	14.70	1	16.6	1	0	0	1	0
Amherst	4.578	6	15.65	2	33.3	0	0	0	1	0
Rest of District	....	143	......	35	25.0	0	0	4	1	0
Totals for the State	....	7,830	......	2,551	....	42	0	72	54	24

† For four weeks

REMARKS.— The total reported mortality for the month of March is 7,830; of which
deaths, a ratio of 211.11 per 1,000 total mortality (159.00 in February). From diarrhœal
diphtheria, 63.50. Twelve deaths from small-pox in the Maritime district occurred in
all zymotic diseases over the preceding month, except from measles. From consumption
above the age of five years. The combined death-ratio per 1,000 from zymotic diseases,
were 153.64 deaths per 1,000 total mortality. Since the issue of the last bulletin, 290
the four weeks ending February 26. No returns have been received this month from

NOTE.— For boundaries of Sanitary Districts see Annual Summary.

MARCH — (*Concluded*).

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	1	0	143.00	2	0	0	0	0	1	0	0	0	1	2
0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	1	0
0	0	1	2	4	2	104.15	15	28	0	3	5	17	6	6	1	4	1
0	0	0	0	0	0	......	0	1	0	0	0	0	1	1	0	1	0
2	1	0	1	1	1	46.66	20	14	1	5	5	10	10	4	2	54	14
....	2	....	2	3	3	51.00	37	32	3	10	5	19	33	5	3	74	21
0	0	0	0	0	1	55.55	4	7	0	2	2	2	10	1	1	5	0
0	0	0	1	0	0	62.50	4	1	1	2	0	1	0	0	0	4	2
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	4	0
0	0	0	0	0	0	......	1	0	0	0	0	1	1	0	0	3	0
0	2	0	1	0	0	300.00	2	1	0	0	0	0	1	0	0	1	2
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	......	0	0	1	0	0	0	1	0	0	5	1
0	0	0	0	1	0	111.11	1	2	0	0	0	1	1	0	0	2	1
0	0	0	0	0	1	62.50	3	1	0	0	1	2	2	0	1	2	3
0	0	0	0	2	0	333.33	1	0	0	0	0	1	0	0	0	2	0
0	0	0	0	0	1	21.12	20	20	1	6	2	11	16	4	1	46	12
9	7	5	6	41	4	131.00	99	87	10	31	31	42	130	18	32	68	69
2	0	0	0	1	0	83.35	6	2	1	1	0	5	7	1	1	2	7
0	0	0	0	0	0	......	0	1	0	1	0	1	0	0	0	5	0
0	0	0	0	0	0	......	0	1	0	0	0	0	2	0	1	2	0
0	0	0	2	0	0	214.75	2	2	2	0	2	1	2	0	0	0	0
0	0	0	0	0	0	......	0	1	0	1	0	0	1	0	0	1	1
0	0	0	0	0	0	111.11	0	1	0	0	0	1	1	1	0	4	0
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	2	0
0	7	0	1	17	0	159.00	23	30	4	10	11	8	30	3	7	6	9
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	3	2
0	0	0	0	0	0	......	1	1	0	0	0	1	3	0	0	7	0
0	0	0	0	0	0	......	1	1	0	0	0	2	0	0	0	0	0
7	0	2	3	17	2	142.85	46	27	1	10	11	13	60	7	20	8	39
0	0	0	0	0	0	333.33	0	1	0	0	0	0	1	0	0	1	1
0	0	0	0	0	0	166.67	1	0	0	0	0	0	2	0	0	1	1
0	0	3	0	6	2	114.25	18	18	2	8	6	10	21	6	3	26	9
98	152	42	48	497	624	......	1,203	664	103	367	377	535	839	197	260	775	857

ending March 26.

32.5 per cent were under five years of age. From zymotic diseases there were 1,653
diseases, the ratio per 1,000 deaths is 79.83; from typhoid fever, 9.20; from croup and
the Kings County Hospital, at Flatbush. There has been an increased mortality from
the ratio of mortality is 84.80 (the lowest ever noted in this bulletin), and 125.78 per 1,000
consumption and puerperal diseases, is 309.00. From acute respiratory diseases there
delayed returns for February have been received. In Buffalo there were 300 deaths for
Newburgh and Long Island City.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	4,978	......	1,747	35.1	24	1	14	52	12
NEW YORK	*1,481,920	3,287	27.00	1,171	35.6	21	0	11	23	12
BROOKLYN	*690,000	1,354	23.87	482	35.6	0	1	1	25	0
Gravesend	*5,000	10	24.00	8	30.0	0	0	0	1	0
Flatlands	3,127	11	42.22	3	27.2	0	0	0	0	0
New Utrecht	4,742	11	27.80	2	18.2	0	0	0	0	0
Newtown	*10,000	18	21.60	9	50.0	1	0	0	0	0
Hempstead	18,160	15	10.00	5	33.3	0	0	0	0	0
North Hempstead	8,000	12	18.00	4	33.3	1	0	0	0	0
Huntington	8,098	8	12.06	2	25.0	0	0	0	0	0
Jamaica	10,089	21	24.96	5	23.9	1	0	0	0	0
Babylon	4,739	7	17.80	2	28.6	0	0	0	0	0
Southold	7,267	11	18.16	1	9.1	0	0	0	0	0
Riverhead	*4,000	6	18.00	1	16.6	0	0	0	0	0
Sag Harbor	*3,000	9	36.00	3	33.3	0	0	0	0	0
Edgewater	*10,000	19	22.00	6	37.5	0	0	0	0	0
Northfield	7,014	9	15.42	1	11.1	0	0	0	0	0
Westfield	*7,000	9	15.43	2	22.2	0	0	0	0	0
YONKERS	*26,000	32	14.76	12	37.5	0	0	1	0	0
Sing Sing	*6,500	12	22.15	3	25.0	0	0	0	0	0
New Rochelle	*5,500	4	8.73	0	....	0	0	0	0	0
Rest of District	....	112	......	30	26.7	0	0	1	3	0
HUDSON VALLEY DIST.:										
Totals	....	852	......	207	24.3	8	....	20	9	...
ALBANY	*96,000	177	22.00	42	23.7	0	0	5	0	0
COHOES	*20,000	34	20.40	10	29.4	0	0	2	1	0
West Troy	*13,000	23	21.23	5	21.7	0	0	2	0	0
Hoosick Falls	*6,000	6	12.00	2	33.3	0	0	1	0	0
TROY	*65,000	98	18.10	30	30.5	6	0	4	0	0
Lansingburgh	*9,700	17	21.00	7	41.2	0	0	1	1	0
Green Island	*5,000	9	21.60	3	33.3	0	0	1	0	0
Greenbush	*7,200	13	21.67	4	30.7	0	0	0	0	0
Coxsackie	4,000	6	18.00	3	50.0	0	0	0	0	0
Catskill	*4,600	11	28.69	2	18.2	0	0	0	0	0
HUDSON	*9,000	21	28.00	4	19.0	0	0	0	0	0
KINGSTON	*21,100	22	12.41	4	17.2	1	0	0	1	0
Wawarsing	8,555	5	7.45	2	40.0	0	0	0	0	0
Rosendale	5,000	8	19.20	1	12.5	0	0	0	0	0
Marbletown	4,000	3	9.00	0	....	0	0	0	0	0
Esopus	4,936	2	5.20	2	100.0	0	0	0	0	0
Saugerties	*4,000	6	18.00	3	50.0	0	0	0	0	0
POUGHKEEPSIE	*20,200	34	20.18	6	17.6	0	0	1	0	0
Wappinger Falls	5,000	8	19.20	1	12.5	0	0	0	1	0
NEWBURGH	*20,000	35	21.00	0	25.8	0	0	0	0	0
Port Jervis	9,500	16	20.00	5	31.2	0	0	0	0	0
Middletown	*10,000	19	22.80	4	21.0	0	0	1	0	0
Goshen	4,387	15	36.00	2	13.3	0	0	0	0	0
Haverstraw	*7,000	16	27.40	4	25.0	0	0	0	1	0
Nyack	*5,000	8	19.20	2	25.0	0	0	1	0	0
Ramapo	5,000	7	16.80	1	14.3	0	0	0	0	0
Rest of District	....	233	......	47	20.4	1	0	2	4	0

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during April, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal.)	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
78	78	29	18	392	88	156.75	942	734	67	240	344	290	484	104	171	354	462
55	43	18	10	271	64	160.63	646	5C4	44	143	238	175	286	70	129	281	243
22	29	9	6	101	13	152.14	249	195	20	65	89	86	167	29	28	30	189
0	0	0	0	0	1	200.00	1	1	0	0	0	3	2	0	0	0	1
0	0	0	0	0	1	91.91	1	1	0	0	0	1	3	0	1	2	1
0	0	0	0	0	0	......	1	3	0	0	0	0	0	0	2	1	4
0	1	0	0	1	0	166.67	2	2	0	1	1	1	3	0	1	0	4
0	0	0	0	5	0	333.33	4	1	0	1	0	1	0	0	0	1	2
0	0	0	0	0	1	166.67	2	2	0	1	2	1	2	0	0	0	0
0	0	0	0	0	0	......	1	0	0	1	1	0	2	0	0	3	0
0	0	0	0	3	0	......	3	2	0	1	1	3	1	2	1	2	1
0	0	0	0	0	0	......	0	1	0	1	0	0	1	1	0	1	2
0	0	0	0	0	0	......	3	2	0	1	0	1	1	0	1	2	0
0	0	0	0	0	0	......	0	1	0	1	1	0	0	0	0	3	1
0	0	0	0	0	0	......	0	0	1	3	0	2	1	0	0	0	2
0	0	0	0	0	0	......	0	3	1	2	0	1	1	0	0	4	1
0	0	0	0	0	0	......	1	1	0	1	1	1	0	1	0	3	0
0	1	0	0	0	1	222.22	2	0	0	2	1	2	0	0	0	0	0
0	1	0	0	7	6	437.50	0	0	0	4	3	4	4	0	2	0	1
0	0	0	0	0	0	......	0	0	0	3	0	1	4	0	0	4	0
0	0	0	0	0	0	......	1	0	0	0	0	2	0	0	1	0	0
1	4	2	2	4	1	160.00	20	14	1	9	6	5	6	1	5	17	10
11	11	4	3	20	5	107.00	111	132	10	55	26	78	107	27	27	110	78
5	2	1	0	2	1	90.38	21	35	2	10	5	33	22	4	3	7	19
0	0	0	0	1	0	117.25	6	5	0	5	2	2	1	1	2	4	2
0	0	0	0	0	0	87.00	6	3	1	1	0	3	3	0	0	2	2
0	0	0	0	1	0	333.33	0	3	0	0	0	0	0	0	0	0	1
0	0	2	0	3	2	175.00	12	14	3	6	3	12	18	3	1	3	6
0	0	0	0	0	0	117.68	3	1	0	2	0	2	5	0	0	0	2
0	0	0	1	0	0	222.22	0	1	0	0	1	1	2	1	1	0	0
1	0	0	0	0	0	71.00	1	4	0	2	0	1	1	1	0	0	2
0	0	0	1	0	0	166.67	2	0	0	0	0	0	0	1	1	1	0
0	0	0	0	2	1	272.73	1	0	0	0	0	0	4	0	0	2	1
0	2	0	0	0	0	95.25	3	6	0	0	1	1	4	1	3	0	0
0	0	0	0	1	0	136.37	4	3	0	5	0	1	1	0	1	4	0
0	0	0	0	0	0	......	0	0	0	0	0	1	2	0	1	0	1
0	0	0	0	0	0	......	3	0	0	0	1	0	3	0	0	1	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	2	0
1	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	1	0	166.67	3	0	0	1	0	0	0	0	0	0	1
0	1	0	0	2	0	117.65	3	6	0	1	5	2	3	0	0	7	3
0	0	0	0	1	0	250.00	0	3	1	0	0	1	0	0	0	0	1
1	2	0	0	0	0	86.00	6	3	0	1	2	6	6	0	0	2	6
0	2	1	0	2	0	312.50	2	0	0	0	0	1	1	0	2	1	4
0	0	0	0	0	0	......	3	5	0	2	0	0	1	1	0	3	4
1	0	0	0	0	0	66.67	2	3	0	0	1	0	2	1	1	4	0
0	0	0	0	2	0	187.50	2	1	0	1	0	1	2	1	2	3	0
0	0	0	0	0	0	125.00	2	0	0	0	0	0	1	1	0	1	2
0	0	0	0	0	0	......	3	0	0	0	1	0	0	0	0	3	0
2	2	0	1	2	1	65.20	23	35	3	18	4	10	25	11	9	60	20

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals....................	....	236	......	38	16.2	2	....	4	....	....
Argyle	3,700	3	9.78	0	....	0	0	1	0	0
Greenwich..................	3,861	3	9.00	1	33.3	0	0	0	0	0
Salem	3,500	4	13.71	1	25.0	0	0	0	0	0
Fort Ann...................	4,267	2	5.50	0	....	0	0	0	0	0
Fort Edward	4,880	4	10.00	1	25.0	0	0	0	0	0
Queensbury	12,000	16	16.00	6	37.5	0	0	0	0	0
Crown Point...............	4,287	4	11.20	0	....	0	0	0	0	0
Port Henry	2,525	2	9.00	0	....	0	0	0	0	0
Malone.....................	7,918	9	13.67	2	22.2	0	0	0	0	0
OGDENSBURGH	11,000	17	18.55	5	29.4	1	0	1	0	0
Gouverneur	5,500	7	15.27	3	42.8	0	0	0	0	0
Ellisburgh................	4,811	6	17.10	0	....	0	0	0	0	0
WATERTOWN	12,200	19	18.80	1	5.2	0	0	0	0	0
Cape Vincent..............	3,143	2	7.65	0	....	0	0	0	0	0
Clayton	4,314	7	19.47	1	14.3	0	0	0	0	0
Rest of District............	....	131	......	17	13.0	1	0	2	0	0
MOHAWK VALLEY DIST.:										
Totals....................	....	319	.....	71	22.2	7	....	6	....	....
SCHENECTADY.....	15,000	32	24.27	10	31.2	2	0	1	0	0
Schoharie..................	3,350	3	10.20	2	66.7	0	0	0	0	0
Middleburgh	3,376	4	14.23	1	25.0	0	0	0	0	0
AMSTERDAM................	*14,000	18	15.48	5	27.8	1	0	1	0	0
Johnstown	*6,000	15	30.00	5	33.3	0	0	0	0	0
Gloversville	*10,000	15	18.00	1	6.6	0	0	1	0	0
Little Falls	7,300	15	24.65	1	6.5	0	0	0	0	0
Ilion	4,200	3	8.57	0	....	0	0	0	0	0
UTICA	*39,000	48	14.77	12	25.0	4	0	1	0	0
ROME.......................	12,045	15	15.00	3	20.0	0	0	0	0	0
Boonville	4,000	5	15.00	0	....	0	0	0	0	0
Camden....................	3,400	7	24.70	0	....	0	0	0	0	0
Waterford	4,326	9	24.94	2	22.2	0	0	0	0	0
Ballston Spa	3,200	4	15.00	1	25.0	0	0	0	0	0
Saratoga Springs	10,000	20	24.00	5	25.0	0	0	0	0	0
Rest of District............	....	106	......	23	22.0	0	0	2	0	0
SOUTHERN TIER DIST.:										
Totals....................	....	213	......	34	16.0	1	....	3	4	....
BINGHAMTON	*24,000	38	19.00	8	21.0	1	0	1	1	0
Owego	6,000	11	22.00	3	25.0	0	0	0	0	0
Waverly...................	3,000	8	32.00	0	....	0	0	0	0	0
ELMIRA	*25,000	27	13.00	5	18.5	0	0	0	1	0
Horseheads................	3,500	1	3.43	0	....	0	0	0	0	0
Hornellsville...............	10,000	6	7.20	0	....	0	0	0	0	0
Bath.......................	3,500	5	17.15	1	20.0	0	0	0	0	0
Olean......................	*8,000	17	25.50	5	29.5	0	0	0	0	0
JAMESTOWN	*12,000	11	11 00	1	9.0	0	0	1	0	0
Fredonia	2,800	3	12.90	1	33.3	0	0	1	0	0
Rest of District............	....	86	......	10	11.6	0	0	0	2	0
EAST CENTRAL DIST.:										
Totals....................	....	310	......	63	30.0	3	....	2	1	....
Walton.....................	3,541	8	26.67	3	37.5	0	0	0	0	0
Cooperstown	*3,000	1	4.00	0	....	0	0	0	0	0

APRIL — *(Continued).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory disease.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
3	2	1	1	9	5	115.00	24	44	4	10	7	11	19	11	8	51	20
0	0	0	0	0	0	333.33	0	0	0	0	0	0	1	0	0	1	0
0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	1	0
1	0	0	0	0	0	250.00	1	0	0	0	0	1	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	......	1	1	1	0	0	0	0	0	0	1	0
0	0	1	0	0	0	62.50	2	1	0	2	0	3	5	1	0	0	1
0	1	0	0	0	0	250.00	1	0	1	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	1	0	0	0
1	0	0	0	0	0	111.11	0	2	0	3	0	1	1	1	0	0	0
0	0	0	0	0	2	235.30	3	2	0	0	2	1	1	0	1	0	3
0	0	0	0	0	2	285.71	0	2	0	0	0	0	0	1	1	0	1
0	0	0	0	0	0	......	2	1	0	0	0	1	0	0	0	2	0
0	0	0	0	0	0	......	1	8	0	1	0	0	3	3	0	1	2
0	0	0	0	0	0	......	0	0	0	0	0	0	0	1	0	1	0
0	0	0	0	1	0	142.85	1	1	0	0	0	1	1	1	0	1	0
1	1	0	1	8	1	115.38	12	24	2	4	5	3	6	2	6	40	12
4	....	1	3	2	3	81.25	40	41	3	30	16	33	31	15	8	56	20
0	0	0	1	0	0	125.00	4	2	0	4	1	10	5	0	0	2	0
0	0	0	0	0	0	......	0	0	0	1	0	0	1	0	0	0	1
0	0	0	0	0	0	......	2	0	0	0	0	1	1	0	0	0	0
1	0	0	0	1	0	222.22	2	8	1	1	0	0	1	0	0	0	1
0	0	0	0	0	0	......	1	1	0	2	2	1	2	1	1	4	0
0	0	0	0	0	0	66.66	2	0	1	0	0	5	0	1	1	3	1
0	0	0	0	0	0	......	0	3	1	0	1	0	0	2	1	6	1
0	0	0	0	0	0	......	0	0	0	0	1	1	1	0	0	0	0
0	0	0	0	0	2	144.45	6	5	0	8	1	6	6	2	0	5	2
0	0	0	0	1	0	66.67	3	0	0	1	0	1	2	1	1	4	1
0	0	0	0	0	0	......	1	0	0	0	0	0	1	0	1	2	0
0	0	0	0	0	0	......	0	1	0	3	0	0	0	1	1	1	0
0	0	0	0	0	0	......	2	3	0	0	3	0	0	1	0	0	0
0	0	1	0	0	0	250.00	1	0	0	0	1	0	0	0	0	0	1
0	0	0	0	0	1	50.00	3	3	0	2	0	0	3	2	1	2	3
3	0	0	2	0	0	70.00	13	15	0	8	6	8	8	4	1	27	9
2	....	2	....	3	....	70.42	32	22	1	14	5	18	31	9	7	34	25
0	0	0	0	1	0	155.26	4	2	0	6	0	5	6	1	2	2	6
0	0	0	0	0	0	......	1	1	0	0	0	0	4	0	0	1	4
0	0	0	0	0	0	......	2	0	0	0	0	0	0	1	0	3	2
1	0	1	0	0	0	111.11	6	6	1	0	1	2	5	1	1	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	1	0	0	1	0	1	0	2	0	0	1
0	0	0	0	0	0	......	0	0	0	0	0	1	1	1	0	1	1
0	0	0	0	0	0	......	3	4	0	1	0	1	1	0	0	4	3
0	0	1	0	0	0	181.81	0	3	0	0	0	0	3	0	1	2	0
0	0	0	0	0	0	333.33	1	0	0	0	0	0	0	0	0	0	1
1	0	0	0	2	0	58.40	14	6	0	6	4	8	10	3	3	20	7
....	5	1	2	3	2	63.33	40	42	7	18	8	22	37	6	15	72	24
0	5	0	0	0	0	625.00	2	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	0	0

MONTHLY BULLETIN FOR

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.— *(Continued):*										
Oneonta	*5,000	7	16.80	4	57.1	0	0	0	0	0
Worcester	3,000	5	20.00	0	....	0	0	0	0	0
Cazenovia	4,363	6	16.50	0	....	0	0	0	0	0
Brookfield	3,685	6	19,00	0	....	0	0	0	0	0
Hamilton	3,911	10	30.00	1	10.0	0	0	0	0	0
Skaneateles	4,860	7	18.00	3	42.8	1	0	0	0	0
SYRACUSE	*70,000	93	15.94	20	21.5	0	0	0	0	0
Cortland	7,361	6	10.00	4	66.6	0	0	1	0	0
Homer	3,000	5	20.00	1	20.0	0	0	0	0	0
Rest of District	....	156	......	27	17.3	2	0	1	1	0
WEST CENTRAL DIST.:										
Totals	....	206	......	32	16.0	1	....	1	4	....
AUBURN	*26,000	26	12.00	3	11.5	1	0	0	3	0
Groton	3,450	3	11.00	1	33.3	0	0	0	0	0
Ithaca	*10,000	10	12.00	2	20.0	0	0	0	0	0
Waterloo	*4,500	2	5.00	0	....	0	0	0	0	0
Hector	5,000	7	17.00	1	14.2	0	0	0	0	0
Manchester	*4,000	6	18.00	3	50.0	0	0	0	0	0
Phelps	*7,000	7	12.00	1	14.2	0	0	0	0	0
Canandaigua	6,300	5	9.52	1	20.0	0	0	0	0	0
Geneva	*6,000	8	16.00	1	12.5	0	0	0	0	0
Penn Yan	4,500	1	2.70	0	....	0	0	0	0	0
Le Roy	*3,000	8	32.00	3	37.5	0	0	0	0	0
Rest of District	....	113	......	16	13.5	0	0	1	1	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	853	......	251	30.0	10	....	6	5	....
OSWEGO	*24,000	38	19.00	8	21.0	0	0	0	0	0
Clyde	3,000	8	32.00	1	12.5	0	0	0	0	0
Lyons	*6,000	8	16.00	1	12.5	0	0	0	0	0
Newark	*3,500	3	10.30	0	....	0	0	0	0	0
Palmyra	*4,800	10	25.00	1	10.0	0	0	0	0	0
Wolcott	3,753	7	22.40	1	14.2	0	0	0	0	0
ROCHESTER	*110,000	165	18.00	48	29.1	0	0	2	1	0
Brockport	*4,500	5	13.34	0	....	0	0	0	0	0
Albion	*5,000	9	21.60	1	11.1	0	0	0	0	0
LOCKPORT	*15,000	12	9.60	1	8.3	0	0	0	0	0
BUFFALO	*202,818	†425	21.80	159	37.4	8	0	4	2	0
Tonawanda	*4,900	7	17.10	4	57.2	0	0	0	0	0
Amherst	4,578	4	10.45	0	....	0	0	0	0	0
Aurora	3,000	10	40.00	0	....	0	0	0	0	0
Rest of District	....	142	......	26	18.6	2	0	0	2	0
Totals for the State	....	7,967	......	2,443	....	56	1	56	75	12

† For five weeks

REMARKS.— The total reported mortality for the month is 7,967; of which 30.6 per cent
136.20 per 1,000 total mortality (211.11 in March). From diarrhœal diseases, the ration per
of small-pox has appeared at Sing Sing and one at New Rochelle, both imported.
Newburgh. From consumption the ratio of mortality is 143.25 and 207.46 per 1,000 above
sumption and puerperal diseases is 292.00; from acute respiratory diseases there were
returns for March have been received.

NOTE.— For boundaries of Sanitary Districts see Annual Summary.

APRIL — *(Concluded).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	0	1	142.85	0	2	0	0	0	0	0	0	0	1	3
0	0	0	0	0	0	......	0	0	0	0	0	2	0	0	0	3	0
0	0	0	0	0	0	......	2	1	0	0	0	1	0	0	0	2	0
0	0	0	0	0	0	......	0	2	0	0	0	0	0	0	1	3	0
0	0	0	0	0	0	......	0	0	0	0	1	2	1	0	1	4	1
0	0	0	0	2	0	285.20	0	1	0	0	1	0	0	0	0	2	0
0	0	1	0	1	0	21.50	15	18	4	5	1	10	18	3	8	5	4
0	0	0	0	0	0	......	1	0	0	1	0	0	1	0	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	3	2
0	0	0	2	0	1	45.00	20	18	3	12	5	7	16	3	5	47	13
....	....	4	1	10	1	110.00	30	22	3	12	9	5	14	7	10	54	18
0	0	1	0	0	0	192.30	5	3	0	2	3	0	3	0	1	1	3
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	2	0
0	0	0	1	0	1	200.00	1	0	0	2	0	0	1	0	0	4	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	2	0	0	1	0	0	0	0	0	4	0
0	0	0	0	0	0	......	0	0	1	0	0	0	2	1	0	0	2
0	0	0	0	0	0	......	0	1	0	1	0	0	0	0	2	3	0
0	0	0	0	1	0	200.00	0	2	0	0	1	0	1	0	0	0	0
0	0	1	0	0	0	125.00	0	3	0	1	1	0	0	1	0	1	0
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	5	0	625.00	0	0	0	0	0	0	1	0	0	2	0
0	0	2	0	4	0	68.75	20	13	2	4	4	5	6	5	7	36	13
14	15	3	2	40	8	117.60	122	109	5	55	17	55	121	28	36	102	100
0	0	1	1	2	0	105.25	4	6	0	0	1	6	4	2	2	3	6
0	0	0	0	0	0	......	0	1	0	0	0	1	2	0	2	1	1
0	1	0	0	0	0	125.00	1	1	0	0	0	0	3	0	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	1	0	1	1	0	0
0	0	0	0	0	0	......	0	2	0	1	0	3	2	0	0	0	2
0	0	0	0	0	0	......	0	3	0	0	0	1	2	0	0	1	0
0	10	0	0	8	0	127.27	27	28	2	9	3	9	18	6	7	25	10
0	0	0	0	1	0	200.00	2	0	0	0	0	0	0	0	0	1	1
0	1	0	0	0	0	111.11	1	0	0	1	0	1	1	0	0	2	1
0	0	0	0	0	1	83.33	0	3	0	1	0	1	1	0	1	2	3
14	1	2	1	27	5	150.58	67	51	2	29	10	23	77	13	14	13	62
0	1	0	0	0	0	142.85	1	0	0	0	1	0	0	1	1	0	2
0	0	0	0	0	0	......	0	2	0	0	0	0	0	0	0	2	0
0	0	0	0	0	1	100.00	2	2	0	1	1	3	0	0	0	1	0
0	1	0	0	2	1	57.12	17	10	1	12	1	7	12	5	8	50	11
112	111	45	30	479	112	......	1,341	1,146	100	434	432	512	844	207	282	833	747

ending April 30th.

were under five years of age. From zymotic diseases there were 1,089 deaths, a ratio of 1,000 deaths is 14.00; from typhoid fever, 7.00; from croup and diphtheria, 60.00. A case Diphtheria is reported epidemic at Victor; scarlatina at Mechanicville and measles at the age of five years. The combined death-ratio per 1,000 from zymotic diseases, con- 167.62 deaths per 1,000 total mortality. Since the issue of the last bulletin 300 delayed

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	4,908	......	1,872	36.2	21	....	18	40	42
New York City	*1,481,920	3,192	25.39	1,245	38.9	21	0	11	22	26
Brooklyn	*745,108	1,256	19.85	480	38.2	0	0	7	20	1
Gravesend	*5,000	3	7.20	0	....	0	0	0	0	0
New Utrecht	4,742	6	15.00	4	66.7	0	0	0	0	0
Long Island City	*21,000	51	28.65	26	52.0	0	0	0	0	1
Newtown	*10,000	23	26.60	9	47.0	0	0	0	0	1
Oyster Bay	*12,000	23	23 00	3	13.0	0	0	0	0	0
Hempstead	18,160	25	16.67	10	40.0	0	0	0	0	0
North Hempstead	8,000	9	13.50	3	33,3	0	0	0	0	0
Huntington	8,098	13	19.25	2	15.4	0	0	0	0	0
Jamaica	10,089	17	20.40	6	35.2	0	0	0	0	1
Babylon	4,739	6	15.20	2	33.3	0	0	0	0	0
Southold	7,267	7	12.00	0	....	0	0	0	1	0
Sag Harbor	*3,000	3	12.00	0	....	0	0	0	0	0
Edgewater	*10,000	21	25.20	5	23.8	0	0	0	1	0
Northfield	7,014	10	17.18	4	40.0	0	0	0	0	0
Westfield	*7,000	8	13.72	3	37.5	0	0	0	0	0
Yonkers	*26,000	45	20.77	20	44.5	0	0	0	2	0
Westchester	*6,900	6	9.00	1	16.7	0	0	0	0	0
Sing Sing	*6,500	10	18.47	1	10.0	0	0	0	0	0
New Rochelle	*5,500	6	13.10	3	50.0	0	0	0	0	0
Rest of District	....	168	......	45	25.5	0	0	0	0	12
HUDSON VALLEY DIST.:										
Totals	....	719	......	157	21.8	13	....	13	2	....
Albany	*96,000	151	18.85	33	22.0	2	0	5	1	0
Cohoes	*20,000	33	19.80	10	30.3	0	0	2	0	0
West Troy	*13,000	24	22.15	7	29.1	0	0	0	0	0
Hoosick Falls	*6,000	9	18.00	4	44.5	0	0	0	0	0
Troy	*65,000	106	19.57	19	18.8	8	0	3	0	0
Lansingburgh	*9,700	25	20.64	6	24.0	0	0	1	0	0
Green Island	*5,000	8	19.20	3	37.5	0	0	0	0	0
Greenbush	*7,200	19	30.25	4	19.0	0	0	0	0	0
Coxsackie	4,000	4	12.00	1	25.0	0	0	0	0	0
Catskill	*4,600	8	20.87	2	25.0	0	0	0	0	0
Hudson	*9,000	10	13.30	0	....	0	0	0	0	0
Kingston	*21,100	19	20.35	4	21.0	0	0	0	1	0
Wawarsing	8,555	4	5.60	3	75.0	0	0	0	0	0
Rosendale	5,000	6	14.40	4	66.6	0	0	0	0	0
Marbletown	4,000	5	15.00	1	20.0	0	0	0	0	0
Esopus	4,736	7	17.50	0	....	0	0	0	0	0
Saugerties	*4,000	10	30.00	2	20.0	0	0	0	0	0
Poughkeepsie	*20,000	36	21.55	11	30.0	1	0	0	0	0
Fishkill	10,732	10	9.68	0	....	0	0	0	0	0
Wappinger Falls	*5,000	3	7.20	1	33.0	0	0	0	0	0
Newburgh	*20,000	16	9.60	5	31.3	0	0	0	0	0
Port Jervis	*9,500	11	13.80	1	9.1	0	0	0	0	0
Middletown	*10,000	8	9.60	3	37.5	0	0	0	0	0
Goshen	4,387	12	34.40	2	16.7	0	0	0	0	0

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during May, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
84	59	27	17	458	110	176.50	832	684	41	229	283	249	541	101	224	285	557
56	33	17	12	323	79	187.50	549	437	28	146	208	159	319	63	156	211	316
25	20	8	2	109	24	171.85	217	174	9	59	63	73	166	29	38	27	185
0	0	0	0	0	0	......	1	1	0	0	0	0	0	0	0	0	1
0	0	0	0	1	0	166.67	0	0	0	0	0	0	1	0	1	0	3
1	1	0	3	3	0	180.00	4	9	0	3	1	4	6	0	7	1	7
0	0	1	0	5	0	300.00	1	4	0	1	0	1	1	0	1	1	6
0	0	0	0	2	0	87.50	4	6	0	0	0	2	1	0	1	5	2
0	1	0	0	0	0	40.00	4	3	0	1	3	0	2	0	2	3	6
0	0	0	0	1	0	111.11	2	2	0	0	0	1	0	0	1	2	0
0	0	0	0	1	1	153.00	3	3	0	0	0	1	2	0	1	0	1
1	0	0	0	5	1	475.00	2	1	0	1	0	0	0	0	1	2	2
0	0	0	0	1	0	166.67	1	1	0	0	1	0	0	0	0	0	2
0	0	0	0	0	0	142.85	2	0	0	0	0	1	1	0	2	0	0
0	0	0	0	0	0	......	2	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	50.00	3	2	1	2	0	1	4	1	2	2	2
0	0	0	0	1	0	100.00	2	3	0	0	0	0	3	0	0	1	0
0	0	0	0	0	1	125.00	0	2	1	1	1	0	0	1	0	1	0
0	0	0	0	6	0	155.55	8	6	0	3	3	2	7	1	2	1	4
0	0	0	0	0	0	......	1	2	1	0	0	0	0	0	0	1	1
0	0	0	0	0	0	......	2	3	0	1	0	0	0	1	0	1	2
0	0	0	0	0	0	......	2	0	0	1	0	0	0	1	0	1	1
1	4	1	0	0	4	130.00	22	24	1	10	3	4	28	4	9	25	16
3	6	2	1	27	4	98.75	81	123	11	45	31	71	77	19	35	79	76
1	0	0	0	2	1	80.00	19	27	1	10	12	26	21	3	6	5	9
0	0	0	0	2	0	121.00	3	7	0	2	0	1	2	0	0	7	7
0	0	0	0	4	0	166.67	6	0	0	3	0	4	3	0	2	0	2
0	0	0	0	0	0	......	2	3	0	1	0	1	1	0	0	0	1
0	0	0	0	7	0	178.80	10	21	1	11	7	10	8	6	3	3	8
0	0	1	0	0	0	80.00	3	5	0	1	1	3	4	0	2	3	1
0	0	0	0	1	0	125.00	0	3	0	0	0	0	1	0	1	1	1
0	0	0	0	0	0	......	4	1	0	2	0	4	3	0	1	0	4
0	0	0	0	0	0	......	1	2	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	1	1	0	2	0	1	2	0	0	1	0
0	0	0	0	0	0	......	1	3	0	0	0	1	1	0	0	4	0
0	0	1	0	2	1	263.18	6	3	2	1	0	1	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	2	0	0	0	0	2
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	0	6
0	0	0	0	0	0	......	0	1	1	0	0	2	0	0	0	0	1
0	0	0	0	0	0	......	0	3	1	0	1	0	0	0	0	2	0
0	1	0	0	0	0	100.00	0	4	0	0	0	1	1	0	0	2	1
0	3	0	0	1	0	140.00	2	4	0	3	2	3	3	1	2	5	6
0	0	0	0	1	0	100.00	0	3	0	1	1	0	0	0	0	3	1
0	0	0	0	0	0	......	1	1	0	0	0	0	0	0	0	0	1
0	0	0	0	0	1	62.50	2	2	1	2	1	1	3	0	1	0	2
0	0	0	0	0	0	......	3	1	0	0	1	0	0	2	0	0	4
0	0	0	0	0	0	......	1	2	0	0	0	0	2	0	1	1	1
2	0	0	0	0	0	166.67	0	4	0	0	1	0	0	0	0	4	1

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
HUDSON VALLEY DIST.—(*Continued*):										
Nyack	*5,000	9	21.60	4	44.5	1	0	0	0	0
Ramapo	5,000	5	12.00	2	40.0	0	0	0	0	0
Rest of District	....	161	......	25	25.7	1	0	2	0	0
ADIRONDACK & NORTHERN DISTRICT:										
Totals	....	204	......	45	22.5	4	....	1	....	....
Argyle	3,700	3	10.00	1	33.3	0	0	0	0	0
Greenwich	3,861	4	10.30	1	25.0	0	0	0	0	0
Salem	3,500	2	7.00	0	....	0	0	0	0	0
Fort Ann	4,267	2	5.75	0	...	0	0	0	0	0
Fort Edward	4,880	9	22.00	4	44.4	0	0	0	0	0
Queensbury	12,000	19	19.00	9	47.4	1	0	1	0	0
Crown Point	4,287	5	13.75	1	20.0	0	0	0	0	0
Malone	7,918	6	9.00	0	....	0	0	0	0	0
OGDENSBURGH	11,000	14	15.28	4	28.6	1	0	0	0	0
Gouverneur	5,500	8	17.45	4	37.5	1	0	0	0	0
Ellisburgh	4,811	5	13.75	0	....	0	0	0	0	0
WATERTOWN	12,200	12	12.00	2	16.7	0	0	0	0	0
Cape Vincent	3,143	2	7.85	0	....	0	0	0	0	0
Lowville	3,188	4	15.00	0	....	0	0	0	0	0
Rest of District	....	109	......	20	18.0	1	0	0	0	0
MOHAWK VALLEY DIST.:										
Totals	....	370	......	74	20.0	6	....	2	1	....
SCHENECTADY	15,000	29	23.20	7	23.5	0	0	0	0	0
Schoharie	3,350	3	11.50	1	33.3	0	0	0	0	0
Cobleskill	3,371	2	7.12	0	....	0	0	0	0	0
AMSTERDAM	*14,000	29	24.85	9	30.5	0	0	1	0	0
Johnstown	*6,000	6	12.00	1	16.7	0	0	0	0	0
Gloversville	*10,000	13	15.60	3	23.1	0	0	0	0	0
Little Falls	7,300	9	14.78	1	11.1	0	0	0	0	0
Ilion	4,200	3	8.57	1	33.3	0	0	0	0	0
UTICA	*40,000	80	24.00	23	28.9	2	0	0	0	0
ROME	12,045	19	19.00	4	21.0	0	0	0	0	0
Boonville	4,000	3	9.00	0	....	0	0	0	0	0
Camden	3,400	5	17.78	0	....	0	0	0	0	0
Waterford	4,326	11	30.50	3	27.2	2	0	0	0	0
Ballston Spa	3,200	9	33.75	3	33.3	0	0	0	0	0
Saratoga Springs	10,000	20	24.00	3	15 0	0	0	0	0	0
Rest of District	....	129	......	15	11.5	2	0	1	1	0
SOUTHERN TIER DIST.:										
Totals	....	175	......	44	25.0	1	....	2	4	....
BINGHAMTON	*25,000	36	17.28	15	41.6	1	0	0	2	0
Owego	6,000	6	12.00	1	16.7	0	0	0	0	0
Candor	4,323	4	11.00	0	....	0	0	0	0	0
Waverly	3,000	3	12.00	0	....	0	0	0	0	0
ELMIRA	*25,000	25	12.00	10	40.0	0	0	1	0	0
Horseheads	3,500	1	3.49	0	....	0	0	0	1	0
Hornellsville	10,000	10	12.00	2	20.0	0	0	0	0	0
Bath	3,500	5	17.18	0	....	0	0	0	0	0
Olean	*8,000	14	21.00	3	21.4	0	0	1	0	0
JAMESTOWN	*14,000	10	8.57	1	10.0	0	0	0	0	0
Fredonia	2,800	6	24.50	2	33.3	0	0	0	1	0
Rest of District	....	55	......	10	18.5	0	0	0	0	0

MAY — *(Continued).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	3	0	444.45	0	1	0	0	0	0	1	1	1	0	1
0	0	0	0	0	0	......	0	1	0	0	0	0	1	1	0	1	1
0	2	0	1	4	1	70.00	16	20	4	6	4	10	20	5	15	35	15
1	1	1	....	6	3	85.00	23	28	3	8	5	12	28	9	7	52	12
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	1
0	0	0	0	0	0	......	1	2	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	1	0
1	0	0	0	0	0	111.11	2	1	0	0	0	0	3	1	1	0	0
0	1	0	0	0	0	157.80	3	2	0	8	0	0	6	1	0	0	1
0	0	0	0	0	0	......	1	1	1	0	0	0	0	0	1	0	1
0	0	0	0	0	0	......	2	1	0	0	0	2	0	0	0	1	0
0	0	1	0	0	0	142.86	3	4	0	0	0	1	1	1	1	0	1
0	0	0	0	4	0	625.00	0	0	0	0	0	0	2	1	0	0	0
0	0	0	0	0	0	......	0	2	0	1	2	0	0	0	0	0	0
0	0	0	0	0	3	250.00	0	1	0	0	0	1	1	2	0	3	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	3	0
0	0	0	0	2	0	30.00	11	13	2	3	2	8	14	3	3	40	7
9	7	2	3	8	1	105.00	29	47	3	28	10	27	44	12	23	72	36
0	0	1	1	4	0	200.00	1	3	0	4	0	2	8	0	2	0	3
0	0	0	0	0	0	......	0	0	0	0	0	0	0	1	1	1	0
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	1	0
0	1	0	0	2	0	137.90	3	6	0	2	0	4	4	0	2	2	2
0	0	0	0	0	0	......	0	0	1	0	0	0	0	0	0	4	1
1	0	0	0	0	0	77.00	1	1	0	1	0	5	0	3	0	1	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	6	0	0
0	0	0	0	0	0	......	0	0	0	0	0	2	1	0	0	0	0
1	5	1	2	1	0	150.00	11	10	0	2	3	5	15	3	2	7	10
0	0	0	0	0	0	......	1	2	1	0	0	0	2	1	2	7	3
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	1	0	0	1	0	0	1	0	0	2	0
0	0	0	0	0	0	171.71	2	1	0	0	0	0	1	0	2	0	3
0	0	0	0	1	0	111.11	1	0	0	4	1	0	1	1	0	0	0
0	0	0	0	0	0	......	2	2	0	2	1	0	2	0	2	5	4
7	1	0	0	0	1	100.00	6	20	1	12	5	8	9	3	4	40	8
6	2	1	....	4	5	142.80	16	16	1	4	6	14	24	5	10	30	24
2	0	0	0	2	1	222.22	2	2	0	1	2	6	4	0	2	3	6
0	0	0	0	0	0	......	1	1	0	0	0	1	1	0	0	0	2
0	0	1	0	0	0	250.00	0	0	0	0	0	2	0	0	0	1	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	1	1	0
1	0	0	0	1	0	120.00	3	2	1	0	1	1	3	1	2	2	6
0	0	0	0	0	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	100.00	1	0	0	0	0	1	2	0	3	1	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	3	2
1	2	0	0	0	0	285.75	1	3	0	0	0	2	1	0	1	0	2
0	0	0	0	1	0	100.00	0	1	0	1	1	0	3	0	0	2	1
0	0	0	0	0	1	333.33	0	1	0	0	0	0	0	0	0	2	1
2	0	0	0	0	2	72.72	8	5	0	2	2	1	10	4	1	15	3

MONTHLY BULLETIN FOR

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.:										
Totals.	....	267	......	45	16.7	2	....	1	5	....
Walton	3,541	5	16.67	1	20.0	0	0	0	0	0
Delhi	3,000	6	24.00	3	50.0	0	0	0	0	0
Cooperstown	*3,000	3	12.00	0	....	0	0	0	0	0
Oneonta	*5,000	11	26.40	1	9.1	0	0	0	0	0
Cazenovia	4,363	5	13.60	0	....	0	0	0	0	0
Brookfield	3,685	2	6.50	1	50.0	0	0	0	0	0
Norwich	5,755	7	15.85	0	....	0	0	0	0	0
Hamilton	3,912	6	18.00	1	16.7	0	0	0	0	0
Skaneateles	4,866	7	17.20	2	28.5	1	0	0	0	0
SYRACUSE	*70,000	84	14.40	19	22.6	0	0	0	4	0
Cortland	7,361	15	24.32	4	26.7	0	0	1	0	0
Homer	3,000	6	24.00	1	16.7	0	0	0	0	0
Rest of District	....	110	......	12	10.9	1	0	0	1	0
WEST CENTRAL DIST.:										
Totals	....	200	......	20	10.0	....	....	....	8	....
AUBURN	*26,000	43	19.85	6	13.9	0	0	0	2	0
Groton	3,450	1	4.00	1	100.0	0	0	0	0	0
Waterloo	*4,500	9	24.00	1	11.1	0	0	0	0	0
Hector	5,000	2	5.00	0	....	0	0	0	0	0
Manchester	*4,000	2	6.00	1	50.0	0	0	0	0	0
Phelps	*7,000	4	6.85	0	....	0	0	0	0	0
Canandaigua	6,300	12	22.85	2	16.7	0	0	0	0	0
Geneva	*6,000	7	14.00	1	14.3	0	0	0	0	0
Penn Yan	4,500	3	8.00	0	....	0	0	0	0	0
Dansville	*3,700	6	19.45	0	....	0	0	0	0	0
Rest of District	....	111	......	8	29.4	0	0	0	1	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	685	......	200	29.4	5	....	....	5	....
OSWEGO	*24,000	22	11.00	4	17.2	0	0	0	0	0
Richland	4,000	6	18.00	2	33.3	0	0	0	0	0
Clyde	3,000	6	24.00	2	33.3	0	0	0	0	0
Lyons	*6.000	7	14.00	0	....	0	0	0	0	0
Newark	*3,500	2	7.00	0	....	0	0	0	1	0
Palmyra	*4,800	6	15.00	1	16.7	0	0	0	0	0
Wolcott	3,753	5	16,00	1	20.0	0	0	0	0	0
ROCHESTER	*110,000	154	16.00	57	37.0	0	0	0	1	0
Brockport	*4,500	4	10.67	0	....	0	0	0	0	0
Medina	*4.000	5	15.00	2	40.0	0	0	0	0	0
Albion	*5,000	9	21.60	2	22.2	0	0	0	0	0
LOCKPORT	*15,000	7	5.60	1	14.3	0	0	0	0	0
BUFFALO	*202,818	†303	19.40	100	33.0	5	0	0	0	0
Rest of District	....	149	......	28	18.8	0	0	0	1	0
Totals for the State	....	7,528	......	2,457	....	52	....	37	66	42

† For four weeks

REMARKS.—The total reported mortality for the month is 7,528; of which 32.6 per cent
153.65 per 1,000 total mortality (136.20 in April; 147.45 in May, 1886). From diarrhœal dis-
theria, 71.70. From small-pox, twenty-six deaths occurred in New York, one in Brooklyn,
Jamaica. No further cases are reported from New Rochelle and Sing Sing; a case is
and 210.00 per 1,000 above the age of five years. The combined death ratio per 1,000 from
diseases there were 145.80 deaths per 1,000 total mortality. Since the issue of the last

NOTE.—For boundaries of Sanitary Districts see Annual Summary.

MAY — (*Concluded*).

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
....	....	2	4	4	3	77.70	23	36	5	16	14	16	33	9	17	54	23
0	0	0	0	0	0	......	0	0	0	1	0	0	1	0	0	2	1
0	0	0	0	0	0	......	3	0	0	0	0	0	0	1	0	2	0
0	0	0	0	0	0	......	0	0	0	0	0	2	0	1	0	0	0
0	0	0	0	1	0	90.91	3	0	1	1	0	1	2	0	0	0	2
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	1	3	0
0	0	0	0	0	1	500 00	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	1	0	0	1	0	1	2	0	0	2	0
0	0	0	0	0	0	......	0	0	0	1	0	1	0	1	0	2	1
0	0	0	0	0	0	142.85	0	0	0	0	0	0	0	0	0	5	1
0	0	1	2	1	2	120.00	7	21	1	1	6	5	13	2	9	4	5
0	0	0	0	0	0	66.66	2	1	0	2	0	0	3	0	2	1	3
0	0	0	0	0	0	......	1	0	0	0	1	0	1	0	0	1	1
0	0	1	2	2	0	62.60	6	13	3	9	7	6	11	4	5	30	9
....	1	3	1	5	5	90.00	20	29	3	18	6	18	15	8	4	52	9
0	0	0	0	0	3	116.28	5	10	0	4	0	5	4	2	3	2	3
0	0	1	0	0	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	111.11	1	2	0	2	0	0	1	0	0	2	0
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	1	0
0	0	0	1	0	0	500.00	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	3	0
0	0	0	0	2	0	166.67	1	1	0	1	0	2	2	1	0	2	0
0	0	0	0	0	0	......	0	1	0	1	0	2	0	1	0	1	1
0	0	0	0	0	0	......	0	2	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	1	1	0	0	1	0	0	0	0	3	0
0	1	2	0	3	1	72.07	11	12	3	9	5	9	8	4	0	37	5
11	20	3	1	28	11	107.00	74	89	4	31	23	38	108	28	39	90	77
0	0	0	0	0	0	......	2	2	0	0	2	3	5	1	3	2	2
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	3	2
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	1	2	2
0	0	0	0	0	0	......	1	1	0	0	0	0	1	1	0	1	2
0	0	0	0	0	0	500.00	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	1	1	1	1	0	1	1
0	1	0	0	0	0	200.00	1	2	0	1	0	0	0	0	0	0	0
2	11	0	1	9	4	181.81	25	18	1	11	9	9	24	7	10	5	7
0	0	0	0	0	0	......	0	1	0	1	0	0	1	0	0	1	0
0	0	0	0	0	0	......	1	0	0	0	0	0	2	0	0	1	1
0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	1	3	3
0	0	0	0	0	0	......	1	3	0	0	1	1	0	0	0	0	1
9	3	2	0	15	4	133.00	34	49	2	13	7	15	59	7	21	18	38
0	5	1	0	4	3	92.00	9	12	1	5	3	6	14	11	3	53	18
114	96	41	27	540	142	......	1,098	1,052	71	379	378	445	870	191	359	714	814

ending May 28.
were under five years of age. From zymotic diseases there were 1,157 deaths, a ratio of
eases, the ratio per 1,000 deaths is 18.85; from typhoid fever, 5.00; from croup and diph-
twelve in the Kings County Hospital, and one each in Long Island City, Newtown and
reported at Westchester. From consumption the ratio of mortality is 139.70 per 1,000,
zymotic diseases, consumption and puerperal diseases is 302.78. From acute respiratory
bulletin 275 delayed returns have been received.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	4,987	......	2,341	47.1	29	....	19	52	7
NEW YORK CITY	*1,481,920	3,224	26.00	1,538	47.7	27	0	16	31	5
BROOKLYN	*757,755	1,306	21.00	663	51.0	0	0	2	18	0
Gravesend	*5,000	11	26.40	6	54.0	0	0	0	0	0
New Utrecht	4,742	5	10.55	1	20.0	0	0	0	0	0
LONG ISLAND CITY	*21,000	51	29.18	24	46.5	1	0	0	0	0
Newtown	*10,000	8	9.60	2	25.0	0	0	0	0	0
Oyster Bay	*12,000	6	6.00	1	16.7	0	0	0	0	†0
Hempstead	18,160	16	10.60	3	18.7	0	0	0	0	0
North Hempstead	8,000	13	19.50	4	30.7	0	0	0	1	0
Huntington	8,098	13	19.26	1	7.7	0	0	0	0	0
Jamaica	10,089	22	26.00	10	45.5	0	0	0	0	0
Babylon	4,739	9	22.00	3	33.3	0	0	0	0	0
Sag Harbor	*3,000	3	12.00	1	33.3	0	0	0	0	0
Edgewater	*10,000	19	21.80	5	26.3	0	0	0	0	0
Northfield	7,014	4	7.00	2	50.0	0	0	0	0	0
Westfield	*7,000	5	8.57	2	40.0	0	0	0	0	0
YONKERS	*26,000	20	9.23	10	50.0	0	0	0	0	0
Westchester	*6,900	6	8.25	2	33.3	0	0	0	0	0
Mount Vernon	*8,000	3	4.50	2	66.6	0	0	0	0	0
Sing Sing	*6,500	9	16.62	7	77.8	1	0	0	0	0
New Rochelle	*5,500	8	17.45	4	50.0	0	0	0	0	0
Rest of District	....	226	......	25	16.0	0	0	1	2	2
HUDSON VALLEY DIST.:										
Totals	....	765	......	271	32.5	16	....	14	2	...
ALBANY	*96,000	158	19.75	52	32.5	2	0	5	0	0
COHOES	*20,000	37	22.20	14	37.8	0	0	2	0	0
West Troy	*13,000	31	28.85	15	48.4	0	0	0	0	0
Hoosick Falls	*6,000	5	10.00	0	....	0	0	0	0	0
TROY	*65,000	143	26.40	57	38.5	11	0	2	0	0
Lansingburgh	*9,700	9	11.14	3	33.3	0	0	0	0	0
Green Island	*5,000	8	19.20	6	75.0	0	0	0	0	0
Greenbush	*7,200	8	13.34	6	75.0	0	0	0	0	0
Coxsackie	4,000	1	3.00	0	....	0	0	0	0	0
Catskill	*4,600	8	20.85	3	37.5	0	0	0	0	0
HUDSON	*9,000	22	29.33	8	36.3	0	0	0	0	0
KINGSTON	*21,100	35	19.90	4	11.5	1	0	0	1	0
Wawarsing	8,555	4	5.65	0	....	0	0	0	0	0
Rosendale	5,000	10	24.00	6	60.0	1	0	0	0	0
Marbletown	4,000	3	9.00	0	....	0	0	0	0	0
Saugerties	*4,000	7	21.00	3	42.8	0	0	0	0	0
POUGHKEEPSIE	*20,200	32	19.00	11	32.0	0	0	3	0	0
Fishkill	10,732	17	19.06	6	35.3	0	0	0	0	0
NEWBURGH	*20,000	24	14.40	6	25.0	0	0	0	1	0
Port Jervis	*9,500	5	6.32	1	20.0	0	0	0	0	0
Middletown	*10,000	12	14.40	4	36.3	0	0	0	0	0
Haverstraw	7,000	14	24.00	4	28.5	0	0	0	0	0
Nyack	*5,000	9	21.60	1	11.1	0	0	0	0	0
Ramapo	5,000	3	7.20	1	33.3	0	0	0	0	0
Rest of District	....	160	......	35	23.0	1	0	2	0	0

† For four weeks

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during June, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
89	35	18	16	395	729	282.48	421	624	40	325	300	261	480	118	218	233	578
55	23	10	11	275	495	294.05	273	411	30	201†	224†	147†	296	81	157	168	288
24	7	8	4	98	206	282.30	119	148	8	98	56	86	150	29	39	23	183
0	0	0	0	0	2	181.82	2	3	0	1	1	1	1	0	0	0	0
0	0	0	0	0	0	......	0	1	0	1	0	0	0	0	0	2	1
1	1	0	1	1	13	358.80	3	7	0	4	4	0	3	0	5	3	4
0	0	0	0	1	0	125.00	0	0	0	1	0	2	0	0	0	1	3
0	0	0	0	1	1	......	1	0	0	1	0	0	0	0	0	1	1
0	0	0	0	4	0	250.00	1	3	0	0	1	1	0	1	0	2	3
0	2	0	0	1	0	307.68	1	2	0	0	1	4	1	0	0	0	0
1	0	0	0	0	0	76.92	0	4	0	1	0	2	1	1	0	3	0
4	0	0	0	5	0	409.00	2	2	0	0	0	2	2	0	1	0	4
0	2	0	0	0	0	222.22	1	0	0	0	0	0	1	0	1	3	1
0	0	0	0	0	0	......	1	0	0	0	1	1	0	0	0	0	0
0	0	0	0	0	2	105.25	0	2	1	0	1	2	1	0	3	3	4
0	0	0	0	0	0	......	1	0	0	0	1	0	1	0	0	0	1
0	0	0	0	0	1	200.00	1	1	0	0	0	1	1	0	0	0	0
0	0	0	0	2	1	150.00	4	3	0	2	0	1	3	0	1	1	2
0	0	0	0	0	0	......	0	1	0	2	1	0	1	0	1	0	0
0	0	0	0	0	2	666.67	0	1	0	0	0	0	0	0	0	0	0
1	0	0	0	1	3	666.67	0	0	1	0	0	0	1	0	0	1	0
0	0	0	0	3	1	500.00	2	0	0	0	1	0	1	0	0	0	0
3	0	0	0	3	2	83.33	9	35	0	13	8	12	15	6	10	22	88
2	8	2	3	30	85	214.00	44	91	5	63	26	83	63	13	49	86	80
1	0	1	0	2	15	162.50	13	23	1	15	5	33	4	4	9	7	18
0	0	0	0	1	5	216.21	2	7	1	1	1	3	1	0	3	3	7
0	0	0	0	5	10	484.00	2	0	0	1	2	4	3	0	1	2	1
0	0	0	0	1	0	200.00	0	0	0	1	0	0	0	0	1	2	0
0	1	0	0	3	30	333.00	11	22	2	10	6	16	13	1	8	1	6
0	0	0	0	1	0	111.11	1	0	0	1	0	0	1	0	0	3	2
0	0	0	0	0	1	125.00	0	0	0	0	0	0	2	2	0	0	3
1	0	0	0	0	0	125.00	1	0	0	1	1	1	3	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	......	2	1	0	2	0	1	0	0	0	2	0
0	2	0	0	0	2	131.31	0	6	0	1	0	2	0	0	5	1	3
0	3	0	0	2	7	400.00	2	2	0	3	2	4	2	0	3	3	0
0	0	0	0	0	0	......	0	0	0	2	0	1	0	0	0	0	1
0	0	0	0	0	2	300.00	0	0	0	0	0	0	0	0	3	0	4
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	1	1	0
0	2	0	0	0	0	285.70	0	0	0	1	0	2	0	0	0	2	0
0	0	1	0	1	2	218.75	1	5	0	2	1	0	8	1	0	5	2
0	0	0	0	0	2	42.00	2	3	0	0	1	1	2	0	3	0	3
0	0	0	0	1	1	125.00	0	3	0	3	2	1	2	0	2	6	2
0	0	0	0	1	0	200.00	0	1	0	0	0	0	1	0	1	0	1
0	0	0	0	0	0	......	1	0	0	2	0	1	2	0	1	1	4
0	0	0	0	0	3	215.85	0	3	0	1	0	0	0	0	0	4	3
0	0	0	0	2	0	222.22	0	1	1	0	1	0	1	0	1	2	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	2	0	0
0	0	0	3	10	5	140.00	7	13	0	15	4	12	18	5	5	40	20

ending July 2

MONTHLY BULLETIN FOR

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals	....	237	......	48	20.1	2	....	3	1	....
Salem	3,500	8	27.42	0	....	0	0	0	0	0
Fort Ann	4,267	3	8.50	0	....	0	0	0	0	0
Fort Edward	4,880	6	14.70	2	33.3	0	0	0	0	0
Queensbury	12,000	14	14.00	0	....	1	0	0	0	0
Port Henry	2,525	2	9.25	0	....	0	0	0	0	0
Malone	7,918	12	43.23	2	16.7	0	0	0	0	0
Potsdam	*4,000	6	18.00	2	33.3	0	0	0	0	0
OGDENSBURGH	11,000	11	12.00	5	45.5	0	0	0	0	0
Gouverneur	5,500	8	17.45	4	50.0	0	0	1	0	0
Ellisburgh	4,811	5	12.50	1	20.0	0	0	0	0	0
Plattsburgh	7,000	8	13.71	4	50.0	1	0	0	0	0
WATERTOWN	12,200	10	10.00	2	20.0	0	0	1	1	0
Cape Vincent	3,143	5	18.70	0	....	0	0	0	0	0
Lowville	3,188	3	12.00	0	....	0	0	0	0	0
Clayton	4,314	7	19.54	1	14.3	0	0	0	0	0
Rest of District	....	129	......	25	19.0	0	0	1	0	0
MOHAWK VALLEY DIST.:										
Totals	....	286	......	72	25.0	1	....	6	1	....
SCHENECTADY	15,000	26	20.80	10	38.4	0	0	1	0	0
Cobleskill	4,371	6	21.36	1	16.7	0	0	0	0	0
AMSTERDAM	*14,000	15	12.85	5	33.3	1	0	1	0	0
Johnstown	*6,000	11	22.00	4	36.3	0	0	1	0	0
Gloversville	*10,000	7	8.40	1	14.3	0	0	0	0	0
Little Falls	7,300	5	8.23	4	80.0	0	0	0	0	0
Ilion	4,200	1	3.00	1	100.0	0	0	0	0	0
UTICA	*40,000	62	18.60	17	27.4	0	0	0	0	0
ROME	12,045	17	17.00	4	23.5	0	0	0	0	0
Boonville	4,000	2	6.00	0	....	0	0	0	0	0
Camden	3,400	3	10.60	0	....	0	0	0	0	0
Waterford	4,326	8	22.18	2	25.0	0	0	0	0	0
Ballston Spa	3,200	4	15.00	0	....	0	0	0	0	0
Saratoga Springs	10,000	19	22.80	3	15.7	0	0	0	0	0
Rest of District	....	100	......	20	20.0	0	0	3	1	0
SOUTHERN TIER DIST.:										
Totals	....	147	......	23	15.7	....	....	3	....	....
BINGHAMTON	*25,000	23	11.04	7	30.5	0	0	1	0	0
Owego	6,000	7	6.00	0	14.3	0	0	0	0	0
Candor	4,323	5	13.88	1	....	0	0	0	0	0
Waverly	3,000	4	16.00	2	50.0	0	0	0	0	0
ELMIRA	*25,000	31	14.88	4	13.0	0	0	0	0	0
Hornellsville	10,000	2	......	0	....	0	0	0	0	0
Bath	3,500	3	10.30	0	....	0	0	0	0	0
Olean	*8.000	6	9.00	1	16.6	0	0	0	0	0
JAMESTOWN	*14,000	8	7.00	2	25.0	0	0	0	0	0
Fredonia	2,800	4	15.75	0	....	0	0	0	0	0
Rest of District	....	54	......	6	11.1	0	0	2	0	0
EAST CENTRAL DIST.:										
Totals	....	232	......	47	20.2	3	....	....	5	....
Walton	3,541	7	23.73	2	28.5	1	0	0	0	0
Delhi	3,000	4	16.00	0	....	0	0	0	0	0
Cooperstown	*3,000	3	12.00	0	....	0	0	0	0	0
Oneonta	*5,000	10	24.00	3	30.0	0	0	0	0	0

JUNE — (*Continued*).

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
2	3	2	3	6	4	109.70	18	32	1	19	2	21	25	3	8	63	19
1	0	0	0	0	0	125.00	0	2	0	2	0	0	1	0	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	2	0
0	1	0	0	0	0	166.66	0	2	0	0	0	0	0	0	0	2	1
0	0	0	1	0	0	142.85	3	1	0	2	0	2	1	0	0	3	0
0	0	1	0	0	0	500.00	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	......	3	1	0	0	0	1	0	0	1	5	1
0	0	0	0	1	0	166.67	0	1	0	1	0	0	1	0	0	2	0
1	0	0	0	0	2	272.73	1	1	0	1	0	1	2	0	0	0	2
0	0	0	1	4	0	750.00	1	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	0	0	0	2	0	1	1	0	0	0	0
0	0	0	0	1	0	250.00	0	1	0	1	0	0	3	0	0	0	1
0	0	0	0	0	0	200.00	1	2	0	1	4	0	0	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	2	1	0	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	2	0
0	0	0	0	0	0	......	0	0	0	1	0	0	1	0	0	5	0
0	2	1	1	0	2	54.00	9	21	1	8	2	9	12	3	7	40	10
2	5	....	1	10	12	132.86	15	42	1	20	18	18	46	21	15	33	19
0	0	0	0	4	3	307.68	1	2	0	2	0	2	7	0	2	0	2
0	0	0	0	1	0	166.67	0	0	0	0	0	1	0	1	1	1	1
0	0	0	0	0	0	133.33	3	0	0	0	0	0	1	2	2	3	2
0	0	0	0	1	1	272.72	0	2	0	1	0	1	1	0	0	3	0
0	0	0	0	0	1	142.85	0	0	0	0	2	1	2	0	0	1	0
0	1	0	0	0	1	400.00	1	0	0	0	0	0	2	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	0	1
0	2	0	0	0	1	50.00	4	10	1	2	3	4	13	12	3	3	4
0	1	0	0	0	0	57.00	1	3	0	0	0	1	1	0	1	8	1
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	1	0
0	0	0	0	0	0	......	0	3	0	3	0	1	0	0	1	0	0
0	1	0	0	0	0	250.00	0	1	0	0	0	0	2	0	0	0	0
0	0	0	0	1	1	105.26	0	3	0	2	2	1	4	0	0	2	3
2	0	0	1	3	4	140.00	5	.16	0	10	11	6	12	6	4	11	5
1	....	1	1	7	5	122.45	10	19	3	18	3	11	18	5	12	18	12
0	0	0	1	2	2	260.87	4	1	2	0	0	1	3	0	2	1	3
0	0	0	0	0	0	......	0	2	0	2	0	0	0	0	1	0	2
0	0	0	0	0	0	......	0	1	0	1	0	0	0	0	1	2	0
0	0	0	0	0	0	......	1	1	0	2	0	0	0	0	0	0	0
0	0	0	0	2	1	225.80	1	6	0	6	0	6	5	2	1	0	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	1	333.33	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	1	0	2	0	0	0	1	1	1	0
0	0	1	0	2	0	375.00	0	0	1	0	1	2	1	0	0	0	0
0	0	0	0	0	0	......	0	2	0	0	0	0	0	0	0	2	0
1	0	0	0	1	1	92.60	4	5	0	5	2	2	9	2	5	10	6
....	1	....	3	7	7	112.07	15	30	....	13	12	19	35	10	14	39	19
0	0	0	0	0	0	142.85	1	2	0	0	1	0	0	0	1	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	3	0
0	0	0	0	0	0	......	0	0	0	0	1	1	1	0	0	0	0
0	0	0	0	3	0	300.00	0	0	0	1	0	0	1	0	2	0	3

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.—*(Continued):*										
Worcester	*3,000	1	4.00	0	....	0	0	0	0	0
Cazenovia	4,363	1	2.85	0	....	0	0	0	0	0
Norwich	5,755	9	18.70	0	...	1	0	0	1	0
Hamilton	3,912	1	3.50	1	100.0	0	0	0	0	0
Skaneateles	4,866	7	17.26	2	28.5	0	0	0	0	0
SYRACUSE	*78,000	85	13.08	25	29.4	1	0	0	4	0
Homer	3,000	4	26.00	0	....	0	0	0	0	0
Rest of District	....	100	......	14	14.0	0	0	0	0	0
WEST CENTRAL DIST.: Totals	....	173	......	14	8.2	1	...	2	2	....
AUBURN	*26,000	31	14.31	2	6.5	0	0	0	0	0
Groton	3,450	2	7.00	0	....	0	0	0	0	0
Ithaca	10,000	17	2.40	2	11.7	0	0	2	0	0
Waterloo	*4,500	6	16.00	0	....	0	0	0	0	0
Hector	5,000	4	9.60	0	....	0	0	0	0	0
Manchester	*4.000	4	12.60	1	25.0	0	0	0	0	0
Phelps	*7,000	7	12.00	1	14.3	0	0	0	0	0
Geneva	*6,000	8	16.00	1	12.5	9	0	0	0	0
Penn Yan	4,500	3	8.00	0	....	0	0	0	0	0
Dansville	*3,700	7	23.54	1	14.3	0	0	0	0	0
Le Roy	3,000	2	8.00	0	....	0	0	0	0	0
Rest of District	....	82	......	6	7.3	1	0	0	2	0
LAKE ONTARIO AND WESTERN DIST.: Totals	....	655	......	229	34.5	5	....	7	4	....
OSWEGO	*24,000	28	14.00	6	21.4	1	0	0	0	0
Richland	4,000	3	9.00	1	33.3	0	0	0	0	0
Fulton	*4,000	4	12,00	0	....	0	0	0	0	0
Clyde	3,000	7	28.00	0	....	0	0	0	0	0
Lyons	*6,000	10	20.00	2	20.0	0	0	0	0	0
Newark	*3,500	3	10.28	0	....	0	0	0	0	0
Palmyra	*4,800	6	15.00	3	50.0	0	0	0	0	0
ROCHESTER	*110,000	139	15.17	60	43.0	1	0	1	1	0
Brockport	*4.500	4	10.67	3	75.0	0	0	0	0	0
Greece	*5,000	6	14.50	3	50.0	0	0	0	0	0
Medina	*4,000	3	9.00	1	33.3	0	0	0	0	0
Albion	*5,000	7	16.80	3	42.8	0	0	0	0	0
LOCKPORT	*15,000	11	11.80	3	21.4	0	0	0	0	0
BUFFALO	*202,818	‡ 292	18.70	109	37.3	3	0	4	3	0
Rest of District	....	139	......	25	18.0	0	0	2	0	0
Totals for the State	....	7,484	......	2,020	....	57	....	54	67	7
Totals for six months for the State	....	45.133	......	15,732	34.8	307	1	348	373	127

‡ For four weeks

REMARKS.—The total reported mortality for the month is 7,414 ; of which 40.0 per cent total mortality; of which 111.00 per 1,000 were from diarrhœal diseases; 7.25 from typhoid only from the Kings county hospital. From consumption there were 127.87 deaths per consumption, zymotic and puerperal diseases was 375.80. From acute respiratory delayed returns, number about 47.500 reported (a rate of 95,000 for the year). Save from month, in the deaths from the respective causes. The zymotic death-ratio is materially

NOTE.—For boundaries of Sanitary Districts, see Annual Summary.

JUNE — *(Concluded).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	1	0	333.33	0	1	0	0	0	0	1	0	0	2	2
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	1	142.85	0	0	0	0	0	0	2	1	1	2	0
0	0	0	2	1	3	141.17	11	14	0	4	6	7	18	4	3	3	3
0	0	0	0	0	0	......	0	1	2	1	0	0	0	0	0	0	0
0	0	0	1	2	2	60.00	3	12	0	5	3	10	11	5	7	28	10
....	....	1	....	2	1	52.02	5	30	3	10	12	15	8	5	13	48	15
0	0	1	0	1	1	96.77	3	7	0	1	0	4	3	1	2	5	2
0	0	0	0	0	0	......	0	0	0	2	0	0	0	0	0	0	0
0	0	0	0	1	0	176.46	0	1	1	0	1	2	1	0	2	5	1
0	0	0	0	0	0	......	0	1	0	0	0	1	2	0	1	1	0
0	0	0	0	0	0	......	0	3	0	0	0	0	0	0	0	0	1
0	0	0	9	0	0	......	0	0	1	1	1	0	0	0	0	0	1
0	0	0	0	0	0	......	0	0	0	0	1	0	0	1	0	4	1
0	0	0	0	0	0	.....	0	2	0	0	1	0	0	0	1	2	2
0	0	0	0	0	0	......	0	0	0	1	0	1	0	0	0	1	0
0	0	0	0	0	0	......	1	1	0	0	0	1	0	0	0	3	1
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	1
0	0	0	0	0	0	36.58	1	15	1	5	8	5	2	3	7	27	5
13	13	2	3	18	44	163.91	59	80	3	48	31	30	109	15	33	77	71
0	0	0	0	0	2	107.18	1	8	1	1	1	5	4	0	1	0	3
0	0	0	0	0	0	......	0	0	0	0	2	0	0	0	0	0	1
0	0	0	0	0	0	......	0	0	0	4	0	0	0	0	0	0	0
0	0	0	0	0	0	......	0	1	1	0	0	0	0	0	0	3	0
0	0	0	0	0	1	100.00	0	2	0	0	0	0	1	0	0	4	2
0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	0	0	1
0	0	0	0	0	1	166.67	0	0	0	0	1	0	1	0	0	1	2
0	1	0	0	8	17	207.15	10	18	1	9	7	7	28	1	5	10	14
0	0	0	0	0	1	250.00	1	0	0	0	0	0	2	0	0	0	0
0	0	0	0	0	1	166.67	1	0	0	1	1	0	2	0	0	0	0
0	0	0	0	0	0	......	0	1	0	0	1	0	0	0	0	0	1
0	0	0	0	0	0	......	0	3	0	0	0	0	3	0	0	0	1
0	0	0	0	0	1	71.43	3	3	0	0	1	0	0	0	2	0	4
9	10	2	1	8	19	202.05	33	31	0	21	7	14	51	9	16	21	30
4	2	0	2	2	1	93.52	10	13	0	12	10	4	15	5	8	38	11
109	65	26	30	475	887	......	587	948	56	516	404	458	784	190	362	597	805
613	1010	212	241	2820	1930	177.30	6,827	8,519	488	2,405	2313	2846	4777	1112	1691	4255	4618

ending June 25.
were under five years of age. From zymotic diseases there were 240.00 deaths per 1,000
fever; 64.00 from diphtheria. From small-pox, deaths are reported, except from New York
1,000, and 214.53 per 1,000 above the age of five years. The combined death-ratio from
diseases there were 79.33 deaths per 1,000. The deaths for six months, noted above, with
diarrhœal and acute respiratory diseases, there has been but little variation, month by
less than that of 1885 and 1886.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT: Totals	....	7,571	......	4,353	57.5	21	..	42	44	12
NEW YORK CITY	*1,481,920	4,593	37.00	2,629	57.0	18	0	33	32	7
BROOKLYN	*757,755	2,197	34.14	1,298	59.0	0	0	7	7	0
Gravesend	*5,000	38	00.00	27	71.0	0	0	0	0	0
New Utrecht	4,742	19	45.60	11	57.8	0	0	0	1	0
Newton	*10,000	75	90.00	50	66.6	0	0	0	0	0
Oyster Bay	*12,000	29	29.00	16	53.0	0	0	0	0	0
Hempstead	18,160	53	35.00	29	54.7	0	0	0	1	0
North Hempstead	8,000	16	24.00	7	43.8	0	0	0	0	0
Huntington	8,098	19	26.18	9	47.2	1	0	0	0	0
Jamaica	10,089	33	38.28	24	72.7	0	0	0	0	0
Southold	7,267	11	18.00	4	36.3	0	0	0	0	0
Sag Harbor	*3,000	8	32.00	8	100.0	0	0	0	0	0
Edgewater	*10,000	35	42.00	20	57.1	0	0	1	0	0
Northfield	7,014	13	22.28	6	46.2	0	0	0	1	0
Westfield	*7,000	16	27.43	8	50.0	0	0	0	0	0
YONKERS	*26,000	64	29.54	45	70.3	0	0	0	0	0
Westchester	*6,900	14	24.50	8	57.1	1	0	0	0	0
Mount Vernon	*8,000	9	12.50	5	55.5	0	0	0	0	0
Port Chester	*4,000	10	30.00	7	70.0	0	0	0	0	0
Sing Sing	*6,500	22	40.60	9	40.9	0	0	0	1	0
New Rochelle	*5,500	14	30.54	11	80.0	0	0	0	0	0
Rest of District	....	283	......	122	42.6	1	0	1	1	5
HUDSON VALLEY DIST.: Totals	....	1,043	.....	427	40.9	8	..	20	4	...
ALBANY	*96,000	235	29.38	93	39.6	1	0	6	0	0
West Troy	*13,000	40	36.90	17	42.5	0	0	1	0	0
Hoosick Falls	*6,000	9	18.00	3	33.3	0	0	0	0	0
TROY	*65,000	191	35.26	80	50.5	6	0	5	0	0
Lansingburgh	*9,700	30	37.10	15	50.0	0	0	1	0	0
Green Island	*5,000	12	28.80	7	58.3	1	0	0	0	0
Greenbush	*7,200	17	28.33	10	58.5	0	0	0	0	0
Coxsackie	4,000	5	15.00	3	60.0	0	0	0	0	0
Catskill	*4,600	10	26.00	3	30.0	0	0	0	0	0
HUDSON	*9,000	24	32.00	5	20.8	0	0	1	0	0
KINGSTON	*21,100	37	21.04	15	40.5	0	0	0	0	0
Wawarsing	8,555	5	7.00	2	33.3	0	0	0	0	0
Rosendale	5,000	5	12.00	4	80.0	0	0	0	1	0
Marbletown	4,000	4	12.00	4	100.0	0	0	0	0	0
Esopus	4,736	7	18.00	1	12.8	0	0	0	0	0
Saugerties	*4,000	11	33.00	8	72.8	0	0	0	0	0
POUGHKEEPSIE	*20,200	43	25.55	15	34.9	0	0	1	1	0
Fishkill	10,732	23	26.40	13	56.5	0	0	1	1	0
Wappinger Falls	*5,000	7	16.80	4	57.1	0	0	0	0	0
NEWBURGH	*20,000	44	26.40	29	65.9	0	0	0	1	0
Port Jervis	*9,500	11	13.00	5	45.5	0	0	0	0	0
Middletown	*10,000	19	21.80	5	26.3	0	0	1	0	0
Goshen	4,387	4	11.50	0	....	0	0	0	0	0
Haverstraw	7,000	9	15.43	4	44.5	0	0	0	0	0
Nyack	*5,000	13	31.20	10	71.0	0	0	0	0	0
Ramapo	5,000	9	21 60	5	55.5	0	0	0	0	0
Rest of District	....	219	......	67	30.0	0	0	3	0	0

† For four weeks

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during July, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive sytem (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
50	39	13	30	293	2,573	410.15	346	625	55	520	291	226	834	119	301	290	847
38	29	8	25	181	1,554	417.40	208	390	32	309†	210†	128†	500	68	182	196	450
13	8	5	1	95	751	403.18	102	182	18	170	57	73	263	38	61	25	321
0	0	0	0	0	27	710.50	0	2	0	3	0	1	0	0	4	0	1
0	0	0	0	0	9	526.30	1	0	0	1	1	0	1	1	4	0	0
0	0	0	0	1	37	506.66	3	3	0	7	3	2	6	0	2	4	7
0	1	0	0	0	11	390.00	1	2	0	1	1	1	6	1	2	1	1
4	0	0	0	3	14	415.10	3	3	0	3	3	1	3	1	2	6	6
0	0	0	0	0	0	......	8	0	3	0	1	1	2	0	0	0	1
0	0	0	0	0	6	368.40	1	2	0	1	0	0	2	0	0	5	1
0	0	0	0	1	17	575.80	0	1	2	2	0	0	1	0	0	3	6
0	0	0	0	0	3	272.72	0	1	0	0	0	1	0	0	0	4	2
0	0	0	0	0	2	250.00	1	0	0	0	0	0	5	0	0	0	0
0	0	0	0	1	11	371.43	0	2	0	3	1	1	6	1	1	1	6
0	0	0	0	0	4	384.61	1	1	0	0	0	2	0	1	0	3	0
0	0	0	0	0	3	187.50	3	0	0	2	0	3	1	0	3	0	1
0	0	0	0	0	28	437.50	1	5	0	3	3	3	10	1	1	2	7
0	0	0	0	0	5	428.71	0	2	0	0	0	0	2	0	3	0	1
0	0	0	0	0	1	111.11	0	1	0	0	0	0	4	1	0	2	0
0	0	0	0	0	5	500.00	0	0	0	1	1	0	0	0	0	2	1
0	0	0	0	1	7	409.10	1	2	0	0	1	0	1	2	2	3	1
0	0	0	0	1	8	642.85	0	0	0	1	0	0	1	0	0	2	1
0	1	0	4	9	70	321.43	12	26	0	13	9	9	20	4	34	31	33
2	8	0	5	26	276	332.68	40	100	13	69	36	80	99	31	56	86	84
0	0	0	0	1	65	310.64	9	22	3	26	10	45	4	5	7	13	18
0	0	0	0	1	12	350.00	4	5	0	2	2	2	6	1	2	0	2
0	0	0	0	0	3	333.33	0	1	0	1	0	0	1	1	0	2	0
0	1	0	0	8	63	436.84	7	23	0	10	7	17	17	1	11	0	15
0	0	0	0	4	9	466.67	1	2	0	3	1	0	1	2	0	3	3
0	0	0	0	0	5	500.00	0	2	1	0	0	0	1	1	0	0	1
0	2	0	0	0	3	290.00	0	2	0	1	0	0	5	0	3	0	1
0	0	0	0	0	1	200.00	0	0	0	0	0	0	1	1	0	1	1
0	0	0	0	0	2	200.00	1	0	0	0	0	1	3	1	2	0	0
0	0	0	0	0	5	250.00	0	3	0	0	2	1	5	0	1	0	6
0	2	0	0	1	8	297.00	2	3	1	4	2	3	6	1	3	1	0
0	0	0	0	0	2	400.00	1	0	0	0	0	0	0	0	2	0	0
0	1	0	0	0	2	800.00	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	4	1000.00	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	128.70	0	2	0	1	0	0	1	0	0	2	0
0	2	0	0	0	3	454.54	1	1	0	0	0	0	1	0	0	1	2
0	0	0	0	3	7	280.00	5	4	1	3	0	0	2	2	1	7	6
0	0	0	0	0	8	434.60	0	2	1	1	0	0	2	1	0	4	2
0	0	0	0	0	2	285.70	0	0	0	0	1	0	2	0	0	0	2
0	0	0	3	0	13	386.26	2	2	0	4	0	2	4	2	1	3	7
0	0	0	0	0	4	363.63	0	2	0	0	1	0	0	0	1	0	3
0	0	0	0	2	2	263.15	2	3	2	0	1	0	3	0	1	1	1
0	0	0	0	0	0	......	0	0	0	0	1	0	0	2	0	1	0
0	0	0	0	1	2	333.33	0	0	1	1	0	0	1	0	3	0	0
0	0	0	0	1	6	538.10	0	1	0	1	0	0	2	0	0	1	1
0	0	0	0	0	4	444.45	0	0	0	2	0	0	1	0	0	2	0
2	0	0	2	4	40	227.27	5	20	3	9	8	9	30	10	18	43	13

ending July 30.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals	....	275	......	80	30.0	3	....	3	....	....
Argyle	3,700	2	6.00	0	....	0	0	0	0	0
Greenwich	3,861	3	9.20	1	33.3	0	0	0	0	0
Salem	3,500	6	20.57	0	....	0	0	0	0	0
Fort Ann	4,267	5	14.00	2	40.0	0	0	0	0	0
Fort Edward	4,880	8	19.25	2	25.0	0	0	0	0	0
Queensbury	12,000	17	17.00	6	35.3	1	0	0	0	0
Port Henry	2,525	2	10.00	1	50.0	0	0	0	0	0
Malone	7,918	13	19.50	4	30.6	0	0	1	0	0
Potsdam	*4,000	10	30.00	5	50.0	0	0	0	0	0
OGDENSBURGH	11,000	13	14.20	7	53.8	0	0	0	0	0
Gouverneur	5,500	15	32.70	8	53.3	0	0	0	0	0
Ellisburgh	4,811	6	15.00	1	16.7	0	0	0	0	0
Plattsburgh	7,000	3	5 15	0	...	0	0	0	0	0
WATERTOWN	12,200	27	26.80	13	44.4	0	0	0	0	0
Lowville	3,188	3	12.00	0	....	0	0	0	0	0
Rest of District	....	142	......	30	20.0	2	0	2	0	0
MOHAWK VALLEY DIST.:										
Totals	....	495	......	194	39.0	4	....	4	1	....
SCHENECTADY	15,000	53	42.40	31	60.0	0	0	0	0	0
Schoharie	3,350	4	14.30	0	....	0	0	0	0	0
Cobleskill	3,371	4	14.26	1	25.0	0	0	0	0	0
AMSTERDAM	*14,000	42	36.00	22	52.0	0	0	0	0	0
Johnstown	*6,000	9	18.00	4	44.5	1	0	0	0	0
Gloversville	10,000	7	8.40	1	14.3	0	0	0	0	0
Little Falls	7,300	17	27.94	5	29.4	0	0	1	0	0
Ilion	4,200	1	3.00	1	100.0	0	0	0	0	0
UTICA	*40,000	101	30.30	49	49.0	2	0	0	1	0
ROME	12,045	29	29.00	12	39.0	0	0	1	0	0
Boonville	4,000	5	15.00	0	....	0	0	0	0	0
Camden	3,400	5	17.65	1	20.0	0	0	0	0	0
Waterford	4,326	15	41.60	12	80.0	0	0	1	0	0
Ballston Spa	3,200	10	37.50	4	40.0	0	0	0	0	0
Saratoga Springs	10,000	21	25.20	5	24.8	0	0	0	0	0
Rest of District	....	172	......	45	26.7	1	0	1	0	0
SOUTHERN TIER DIST.:										
Totals	....	246	......	98	40.0	2	....	5	2	....
BINGHAMTON	*25,000	51	24.48	29	48.0	0	0	2	2	0
Owego	6,000	4	8.00	0	....	0	0	0	0	0
Candor	4,323	7	19.43	2	28.5	0	0	0	0	0
Waverly	3,000	3	12.00	3	100.0	0	0	0	0	0
ELMIRA	*25,000	43	20.64	20	46.5	1	0	0	0	0
Horseheads	3,500	7	24.00	4	57.1	0	0	0	0	0
Hornellsville	10,000	8	9.60	1	12.5	0	0	0	0	0
Bath	3,500	6	19.15	2	40.0	0	0	0	0	0
Olean	*8,000	16	24.00	8	50 0	0	0	0	0	0
JAMESTOWN	*14,000	22	18.71	7	31.8	0	0	2	0	0
Rest of District	....	79	......	21	24.6	1	0	1	0	0
EAST CENTRAL DIST.:										
Totals	....	313	......	111	36.6	....	....	5	3	....
Delhi	3,000	4	16.00	0	....	0	0	0	0	0
Franklin	3,500	3	10.10	0	....	0	0	0	0	0
Cooperstown	*3,000	3	12.00	0	....	0	0	0	0	0

JULY — *(Continued).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
1	1	....	....	8	46	225.45	8	28	5	16	15	12	20	15	17	55	22
0	0	0	0	0	0	......	1	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	2
0	0	0	0	1	0	166.67	0	0	0	0	0	0	0	2	1	2	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	1	2	1
0	0	0	0	0	1	125.00	0	1	0	1	0	0	0	0	1	2	2
0	0	0	0	0	2	176.00	0	2	1	1	1	0	3	1	0	3	2
0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	4	384.50	0	0	1	0	1	1	1	0	1	1	2
0	0	0	0	0	4	400.00	1	2	0	0	0	0	0	0	1	2	0
0	0	0	0	0	4	307.00	0	1	0	0	0	1	2	0	1	3	1
0	0	0	0	2	4	400.00	2	3	0	0	1	0	1	0	2	0	0
0	0	0	0	0	0	......	0	0	0	1	0	0	2	2	0	1	0
0	0	0	0	0	0	......	0	2	0	1	0	0	0	0	0	0	0
0	0	0	0	0	13	444.44	1	2	2	1	2	0	1	3	1	1	0
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	2	0
1	1	0	0	5	13	150.00	3	14	1	10	10	10	10	6	8	34	12
3	3	....	2	23	145	380.00	16	45	5	19	10	28	51	12	19	71	34
0	0	0	1	8	12	400.00	1	9	0	2	0	2	11	1	0	2	4
0	0	0	0	2	0	500.00	0	0	0	0	0	0	0	0	0	1	1
0	0	0	0	1	0	250.00	0	1	0	0	0	0	1	0	0	0	1
0	0	0	0	6	18	588.00	1	4	1	2	1	3	2	1	1	0	2
0	0	0	0	0	2	333.33	0	1	0	0	0	0	1	1	1	0	2
0	0	0	0	0	2	285.70	0	3	0	0	1	1	0	0	0	0	0
0	0	0	0	1	3	294.60	0	0	0	0	0	1	2	0	1	6	2
0	0	0	0	0	1	1000.00	0	0	0	0	0	0	0	0	0	0	0
0	1	0	1	1	38	440.00	6	11	0	2	1	6	14	2	4	6	5
0	0	0	0	1	10	390.75	1	1	0	1	0	1	1	1	2	6	3
0	3	0	0	0	0	......	0	0	1	1	0	0	1	0	0	2	0
0	0	0	0	0	1	200.00	0	0	0	0	1	0	0	2	0	1	0
0	0	0	0	0	12	866.67	0	1	1	0	0	0	0	0	0	0	0
0	1	0	0	0	3	400.00	0	0	0	2	1	0	2	0	0	1	0
0	0	0	0	0	3	148.75	2	1	0	1	2	3	4	0	1	3	1
3	1	0	0	3	40	288.25	5	13	2	8	3	11	12	4	9	43	13
3	....	1	....	4	62	320.00	12	18	5	13	4	12	24	8	19	32	20
1	0	0	0	1	18	470.58	2	2	3	4	0	4	7	0	3	1	1
0	0	0	0	0	0	......	2	0	0	0	0	0	0	1	0	1	0
0	0	0	0	0	2	285.70	0	2	0	0	0	0	0	0	0	0	0
0	0	0	0	0	2	666.67	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	16	400.00	5	3	1	1	2	0	5	2	2	1	4
0	0	0	0	0	2	285.70	0	1	0	1	0	0	0	0	1	0	2
0	0	0	0	0	0	......	1	0	0	1	0	2	1	0	1	1	1
0	0	0	0	0	2	333.33	0	0	0	0	0	0	0	1	1	2	0
1	0	0	0	0	7	500.00	0	1	0	1	0	1	0	0	2	2	1
0	0	0	0	1	0	136.36	1	3	0	1	0	3	1	0	3	2	5
1	0	1	0	2	13	240.50	1	6	1	3	2	2	10	4	6	20	5
....	1	....	4	6	67	280.00	5	29	1	5	10	11	43	7	21	53	42
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	1	2	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	3	0
0	0	0	0	0	0	......	0	0	0	0	0	0	3	0	0	0	0

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.—*(Continued):*										
Oneonta	*5,000	10	24.00	7	70.0	0	0	0	0	0
Worcester	*3,000	6	24.00	0	....	0	0	0	0	0
Brookfield	3,685	2	6.50	0	....	0	0	0	0	0
Norwich	5,755	7	14.60	3	42.8	0	0	0	0	0
Hamilton	3,912	2	6.20	0	....	0	0	0	0	0
Baldwinsville	3.000	3	12.00	0	....	0	0	0	0	0
SYRACUSE	*78,000	149	22.92	78	52.0	0	0	5	0	0
Homer	3,000	4	16.00	0	....	0	0	0	0	0
Rest of District	....	120	......	23	19.2	0	0	0	3	0
WEST CENTRAL DIST.:										
Totals	... .	202	......	46	23.0	....	....	2	....	....
AUBURN	*26,000	46	21.23	19	41.3	0	0	0	0	0
Groton	3,450	3	10.50	0	....	0	0	0	0	0
Ithaca	10,000	11	13.20	4	36.3	0	0	0	0	0
Waterloo	*4,500	6	16.00	1	16.7	0	0	0	0	0
Seneca Falls	*6,000	10	20.00	2	20.0	0	0	0	0	0
Manchester	*4,000	3	9.00	0	....	0	0	0	0	0
Phelps	*7,000	4	7.00	2	50.0	0	0	0	0	0
Canandaigua	6,300	8	15.24	0	....	0	0	0	0	0
Geneva	*6.000	14	28.00	5	35.7	0	0	0	0	0
Attica	3,100	5	19.35	0	....	0	0	1	0	0
Penn Yan	4,500	2	5.35	0	....	0	0	0	0	0
Le Roy	3,000	4	16.00	1	25.0	0	0	0	0	0
Rest of District	....	86	......	12	14.0	0	0	1	0	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	1,318	......	740	56.8	13	....	21	7	....
OSWEGO	*24,000	38	19.00	13	33.0	0	0	3	1	0
Richland	*4,000	2	6.00	0	....	0	0	0	0	0
Fulton	*4,000	7	21.00	3	42.8	0	0	1	0	0
Clyde	*3,000	4	16.00	1	25.0	0	0	0	0	0
Lyons	*6,000	7	14.00	1	14.3	0	0	0	0	0
Newark	*3,500	4	13.70	0	....	0	0	0	0	0
Palmyra	*4,800	11	27.50	3	27.3	0	0	0	0	0
ROCHESTER	*110,000	293	32.18	175	58.3	0	0	2	0	0
Brockport	*4,500	6	16.00	2	33.3	0	0	0	0	0
Albion	*5,000	4	9.60	1	25.0	0	0	0	0	0
LOCKPORT	*15,000	17	13.33	6	36.0	1	0	0	0	0
BUFFALO	*202,818	‡714	36.66	466	65.2	11	0	7	5	0
Tonawanda	*4,900	11	26.95	5	45.4	0	0	1	0	0
Amherst	4,578	8	20.50	1	12.5	0	0	0	0	0
Rest of District	....	192	......	63	32.6	1	0	7	1	0
Totals for the State	....	11,463	......	6,049	....	51	....	102	61	12

‡ For five weeks

REMARKS.—The total reported mortality for the month is 11,463, the largest ever
respectively. The percentage of deaths under five years is 52.7. Of 123 reporting
localities it is excessive from a large transient population. From zymotic diseases
nearly one-third of the total mortality were from diarrhœal diseases; 8.88 from typhoid
deaths occurred. From consumption the death-rate per 1,000 was only 83.40, and 176.58
and puerperal diseases is 481.00 per 1,000. Nine deaths from sunstroke were reported

NOTE.—For boundaries of Sanitary Districts see Annual Summary.

JULY — *(Concluded)*.

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	3	3	2	800.00	0	2	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	166.67	0	0	0	0	0	1	2	0	1	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	1	0
0	0	0	0	0	2	285.70	0	0	0	0	0	0	1	0	1	2	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	1	0
0	1	0	0	1	52	396.00	1	15	0	0	6	6	25	0	7	0	30
0	0	0	0	0	0	......	0	0	0	0	0	0	0	2	1	1	0
0	0	0	1	1	11	133.33	4	11	1	5	3	4	10	5	10	40	11
....	....	....	2	2	27	160.00	7	22	2	17	6	10	31	7	11	40	16
0	0	0	0	0	13	282.60	2	5	1	2	1	0	12	0	1	2	7
0	0	0	0	0	0	......	0	0	0	0	0	1	1	0	0	1	0
0	0	0	0	0	2	181.81	0	0	0	3	1	1	2	1	0	1	0
0	0	0	0	0	0	......	0	1	1	1	0	0	2	0	0	0	1
0	0	0	1	0	1	200.00	0	2	0	1	1	2	0	0	1	0	1
0	0	0	0	0	0	......	0	1	0	0	0	1	1	0	0	0	0
0	0	0	0	0	1	250.00	0	1	0	0	0	1	1	0	0	0	0
0	0	0	0	1	0	125.00	0	1	0	0	0	1	1	0	1	2	0
0	0	0	0	0	4	285.70	1	3	0	0	0	0	2	0	0	4	0
0	0	0	0	0	0	200.00	0	0	0	1	0	1	0	0	1	2	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	1	250.00	0	0	0	0	0	0	1	0	0	2	0
0	0	0	1	1	5	93.00	3	8	0	9	3	3	7	6	7	25	7
10	13	1	5	13	473	428.00	43	89	4	79	34	50	157	28	55	102	120
0	0	0	0	0	7	289.45	0	9	0	1	1	3	4	0	2	4	3
0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	0	0	0
0	0	0	0	0	2	428.57	1	1	0	0	0	0	0	1	0	1	0
0	0	0	0	0	1	250.00	0	0	0	0	0	1	0	1	1	0	0
0	0	0	0	0	1	142.85	0	2	0	1	0	0	0	0	1	2	0
0	0	0	0	0	0	......	0	1	0	0	0	0	2	0	0	0	1
0	0	0	0	1	2	272.73	0	2	0	1	0	1	0	0	1	2	1
0	0	0	0	2	122	423.35	14	15	2	9	11	9	47	2	16	17	24
0	0	0	0	1	2	500.00	0	1	0	0	0	0	0	0	0	2	0
0	0	0	0	0	1	250.00	0	0	0	0	0	0	0	0	0	2	1
0	0	0	0	0	4	290.00	3	0	0	2	2	0	0	1	1	2	1
9	13	1	4	8	280	‡482.85	23	44	1	55	13	28	83	15	25	18	71
0	0	0	0	0	5	545.45	0	0	0	2	0	1	0	0	1	1	0
0	0	0	0	0	1	125.00	0	0	0	0	0	0	1	0	1	5	0
1	1	0	1	0	45	290.00	2	13	1	8	7	6	20	8	6	46	18
69	66	15	48	375	3669	......	477	956	90	738	406	429	1259	227	499	729	1185

ending July 30.

recorded in this Bulletin, and exceeding by more than 2,000 that of July, 1885, and 1886,

localities the average annual death-rate per 1,000 is 21.76; in many of the smaller

there were 4,468 deaths, being 389.68 per 1,000 total mortality; of these 320.00 per 1,000 or

fever; 32.68 from diphtheria. From all other zymotic diseases but a limited number of

per 1,000 above five years of age. The combined death ratio from consumption, zymotic

outside of the large cities, and four deaths from lightning stroke.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals....................	....	5,463	......	2,728	49.9	19	....	80	64	6
NEW YORK CITY	*1,481,920	3,280	26.06	1,604	48.9	13	0	51	36	4
BROOKLYN..................	*757,755	1,537	23.88	841	54.7	0	0	20	18	0
Gravesend..................	*5,000	14	33.60	5	35.7	0	0	0	0	0
New Utrecht	4,742	18	43.10	15	83.3	0	0	0	0	0
LONG ISLAND CITY	*21,000	78	44.57	48	61.5	0	0	0	1	0
Newtown.....	*10,000	27	32.40	15	55.5	0	0	0	0	0
Oyster Bay	*12,000	26	24.00	11	45.8	2	0	0	0	0
Hempstead	18,160	21	14.00	11	52.4	0	0	0	0	0
North Hempstead.........	8,000	20	30.00	8	40.0	1	0	0	0	0
Huntington................	8,100	14	20.74	4	28.5	0	0	0	0	0
Jamaica	10,089	27	32.00	16	59.2	0	0	0	0	0
Southold..................	7,267	16	26.42	3	18.8	0	0	0	0	0
Edgewater................	*10,000	21	25.20	12	57.1	0	0	1	0	0
Northfield	7,014	20	34.28	5	25.0	0	0	1	0	0
Westfield	*7,000	11	18.85	4	36.3	1	0	0	0	[illegible]
YONKERS	*26,000	45	20.77	19	42.2	0	0	0	2	0
Westchester	*6,900	9	15.65	3	33.3	0	0	0	1	0
Mount Vernon	*8,000	11	16.75	9	81.8	0	0	0	0	0
Port Chester...............	*4,000	5	15.00	3	60.0	0	0	1	0	0
Sing Sing..................	*6,500	17	27.69	6	40.0	0	0	0	2	0
New Rochelle..............	*5,500	20	39.63	11	57.9	1	0	0	0	0
Rest of District............	....	226	......	75	33.2	1	0	6	4	2
HUDSON VALLEY DIST.:										
Totals....................	....	986	......	346	35.3	11	....	29	16	....
ALBANY....................	*96,000	202	25.24	66	32.6	1	0	8	0	0
West Troy.........	*13,000	29	26.75	12	40.0	0	0	0	0	0
TROY	*65,000	132	24.37	48	36.4	8	0	6	0	0
Lansingburgh	*9,700	26	32.16	10	28.4	0	0	0	0	0
Green Island.............	*5,000	6	14.40	2	33.3	0	0	0	0	0
Greenbush	*7,200	9	15.00	8	88.8	0	0	0	0	[illegible]
Coxsackie	4,000	5	15.00	4	80.0	0	0	0	0	0
Catskill....................	*4,600	9	23.48	4	55.5	0	0	0	0	0
HUDSON	*9,000	15	20.00	3	20.0	0	0	0	0	0
KINGSTON	*21,100	52	29.57	22	40.0	1	0	2	4	0
Wawarsing	8,555	6	8.40	1	16.7	0	0	0	0	[illegible]
Rosendale	5,000	8	19.20	6	75.0	0	0	0	0	0
Marbletown	4,000	6	18.00	1	16.7	0	0	0	0	[illegible]
Esopus....................	4,736	8	20.25	1	12.4	0	0	0	2	[illegible]
Saugerties................	*4,000	11	33.00	3	27.3	0	0	0	1	[illegible]
POUGHKEEPSIE	*20,200	38	22.57	13	34.2	0	0	0	0	[illegible]
Wappinger Falls..........	*5,000	4	9.60	1	25.0	0	0	0	0	[illegible]
NEWBURGH.................	*20,000	47	28.20	19	40.4	0	0	0	0	[illegible]
Port Jervis...............	*9,500	14	17.70	6	42.8	0	0	1	0	[illegible]
Middletown...............	*10,000	18	21.60	6	33.3	0	0	0	1	[illegible]
Haverstraw...............	7,000	11	18.86	4	36.4	0	0	0	0	[illegible]
Ramapo..................	5,000	11	26.40	6	54.5	0	0	0	2	[illegible]
Rest of District............	....	319	......	100	31.2	1	0	12	6	[illegible]

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during August, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
34	8	6	30	208	1,299	321.00	329	600	34	411	272	245	599	115	222	237	645
21	6	3	24	125	752	315.54	216	396	24	243	189	142	322	73	154	139	347
9	0	2	5	70	373	323.35	96	147	5	132	59	70	206	31	46	17	231
0	0	0	0	0	4	285.71	0	2	0	1	0	0	0	1	5	0	4
0	0	0	0	0	9	500.00	0	2	0	0	0	0	1	0	0	1	5
2	1	0	0	0	29	423.07	1	6	1	3	1	5	7	1	3	7	10
0	0	0	0	1	3	148.14	0	2	0	2	1	1	7	0	0	5	5
0	0	0	0	0	8	416.66	0	0	0	0	2	0	3	1	2	8	0
0	0	0	0	0	13	648.00	1	0	0	0	0	1	1	1	0	4	0
0	0	0	0	0	8	450.00	0	4	0	0	0	3	2	0	0	2	0
0	0	0	0	0	2	142.50	2	0	1	0	0	0	2	1	0	4	2
0	0	0	0	2	10	444.44	0	1	0	1	3	0	2	0	2	0	6
0	0	0	0	0	0	......	1	3	0	2	0	1	3	0	1	1	4
0	0	0	0	0	7	381.00	0	2	0	0	1	0	3	0	1	3	3
0	1	1	0	1	0	200.00	1	1	0	1	1	2	1	2	1	4	2
0	0	0	0	2	3	545.45	0	0	0	1	0	1	0	0	0	2	1
0	0	0	0	2	12	355.55	3	3	1	0	5	4	9	1	0	0	3
0	0	0	0	0	2	333.33	0	2	0	0	1	0	1	0	0	2	0
0	0	0	0	0	9	818.18	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	2	600.00	0	0	0	0	1	0	1	0	0	0	0
0	0	0	0	0	4	400.00	1	2	1	1	0	2	0	0	0	0	4
0	0	0	0	2	5	436.70	0	2	0	0	0	2	0	0	1	4	3
0	0	0	0	3	44	336.25	6	24	1	24	8	11	28	3	6	34	18
4	5	2	5	29	203	300.00	48	103	11	79	29	74	85	21	40	124	68
3	0	0	0	6	20	158.75	12	27	2	24	10	35	12	9	9	10	12
0	0	0	0	2	8	300.00	7	1	0	1	0	2	6	0	0	0	2
0	0	0	0	7	35	424.24	8	18	5	9	3	12	5	0	3	3	10
0	0	0	0	0	10	384.62	2	1	0	1	1	0	1	0	4	4	2
0	0	0	0	1	1	333.33	0	1	0	1	1	1	0	0	0	0	0
0	0	0	0	1	2	333.33	1	0	0	1	0	2	0	0	1	0	1
0	1	0	0	0	1	400.00	0	0	1	1	0	0	1	0	0	0	0
0	0	0	0	0	4	555.55	0	1	0	0	0	2	1	0	0	1	0
0	0	0	0	0	2	133.33	0	3	0	2	1	0	3	0	2	2	0
0	3	0	3	2	12	540.00	3	2	0	2	2	6	4	1	2	2	1
0	0	0	0	1	0	166.67	0	0	0	1	0	1	0	0	1	2	0
0	1	0	0	0	1	250.00	0	0	0	0	0	0	4	1	0	1	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	1	0	2	2
0	0	0	0	1	1	500.00	0	2	0	1	0	0	0	0	0	1	0
0	0	0	0	3	1	454.55	0	0	0	0	0	0	2	0	1	3	0
0	0	0	0	0	8	210.50	1	5	0	1	2	1	5	2	1	10	3
0	0	5	0	0	1	250.00	1	0	0	0	0	0	0	0	1	1	0
0	0	0	2	0	13	319.15	3	4	0	4	1	1	2	0	0	12	5
0	0	0	0	0	2	214.28	0	0	0	0	1	1	1	1	2	0	5
0	0	0	0	1	4	333.33	0	3	0	0	0	2	3	1	1	2	0
0	0	0	0	1	4	454.55	0	2	0	1	0	0	1	0	0	1	1
0	0	0	0	0	5	636.36	0	1	0	0	1	0	0	0	0	2	0
1	0	2	0	3	68	284.40	9	32	3	29	6	8	35	5	12	65	22

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals	....	302	......	125	41.5	3	....	15	....	....
Argyle	3,700	3	10.90	2	66.6	0	0	0	0	0
Greenwich	3,861	5	15.40	3	60.0	0	0	0	0	0
Fort Ann	4,267	4	11.00	2	50.0	0	0	0	0	0
Fort Edward	4,880	9	22.04	3	33.3	1	0	0	0	0
Queensbury	12,000	18	18.00	8	44.5	0	0	0	0	0
Port Henry	2,525	2	10.00	1	50.0	0	0	0	0	0
Malone	7,918	13	20.00	5	38.5	1	0	2	0	0
Potsdam	*4,000	8	22.50	3	42.8	0	0	1	0	0
OGDENSBURGH	*11,000	20	21.82	8	40.0	0	0	1	0	0
Gouverneur	5,500	11	24.00	4	36.4	0	0	3	0	0
Ellisburgh	4,811	2	5.00	0	....	0	0	0	0	0
Plattsburgh	*7,000	18	31.14	15	83.3	0	0	0	0	0
WATERTOWN	*12,200	24	23.50	12	50.0	1	0	1	0	0
Cape Vincent	3,143	5	19.75	2	40.0	0	0	0	0	0
Clayton	4,314	5	14.00	3	60.0	0	0	0	0	0
Rest of District	....	155	......	54	34.8	0	0	7	0	0
MOHAWK VALLEY DIST.:										
Totals	....	463	......	155	33.5	....	....	14	1	....
SCHENECTADY	15,000	41	32.85	21	50.0	0	0	0	0	0
Schoharie	3,350	6	21.50	2	33.3	0	0	0	0	0
Middleburgh	3,376	3	11.00	1	33.3	0	0	0	0	0
AMSTERDAM	*14,000	22	18.28	7	31.8	0	0	2	0	0
Johnstown	*6,000	10	20.00	3	30.0	0	0	0	0	0
Gloversville	10,000	10	10.00	2	20.0	0	0	0	0	0
Little Falls	7,300	15	24.65	7	46.7	0	0	0	0	0
Ilion	4,200	5	14.30	1	20.0	0	0	0	0	0
UTICA	*40,000	89	26.70	33	37.0	0	0	8	0	0
ROME	12,045	27	26.75	9	33.3	0	0	0	1	0
Boonville	4,000	10	30.00	2	20.0	0	0	0	0	0
Camden	3,400	4	14.12	1	25.0	0	0	1	0	0
Waterford	4,326	15	41.60	8	53.3	0	0	1	0	0
Ballston Spa	3,200	7	26.25	4	57.1	0	0	0	0	0
Saratoga Springs	10,000	40	48.00	19	47.5	0	0	0	0	0
Rest of District	....	159	......	35	22.0	0	0	2	0	0
SOUTHERN TIER DIST.:										
Totals	....	262	......	88	33.6	1	....	13	2	....
BINGHAMTON	*25,000	52	25.00	24	46.1	1	0	3	1	0
Candor	4,323	15	41.60	4	26.7	0	0	0	0	0
Waverly	3,000	5	20.00	2	40.0	0	0	0	0	0
ELMIRA	*25,000	36	17.30	14	38.8	0	0	2	0	0
Horseheads	3,500	3	10.30	2	66.6	0	0	0	0	0
Hornellsville	10,000	6	7.20	3	50.0	0	0	0	0	0
Bath	3,500	5	17.14	0	....	0	0	1	0	0
Corning	*8,000	15	22.50	7	46.7	0	0	0	0	0
Olean	*8,000	14	21.00	5	35.0	0	0	0	0	0
Fredonia	2,800	4	17.00	3	75.0	0	0	0	0	0
Rest of District	....	107	......	24	22.6	0	0	7	1	0
EAST CENTRAL DIST.:										
Totals	....	338	......	108	31.8	....	....	16	5	....
Walton	3,541	6	20.33	0	....	0	0	0	0	0
Delhi	3,000	5	20.00	2	40.0	0	0	0	0	0
Cooperstown	*3,000	6	24.00	2	33.3	0	0	0	0	

AUGUST — *(Continued)*.

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
....	....	3	7	3	76	356.60	5	34	3	18	5	16	18	8	11	54	23
0	0	0	0	0	1	333.33	0	1	0	1	0	0	0	0	0	0	0
0	0	0	0	0	3	600.00	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	1	......	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	1	222.22	0	1	0	0	0	0	1	0	2	2	1
0	0	0	0	0	5	260.11	0	0	0	2	0	4	2	1	0	2	2
0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	4	538.50	1	2	0	1	0	1	0	0	0	1	0
0	0	0	0	0	2	428.57	0	2	0	1	0	0	1	0	0	0	1
0	0	0	0	0	7	400.00	0	4	0	0	0	2	0	0	1	3	2
0	0	0	0	0	3	535.35	0	1	0	0	2	0	0	1	0	0	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	1	0	0	10	611.10	0	2	0	0	0	0	0	0	0	1	4
0	0	0	0	1	9	500.00	0	4	0	1	0	0	4	0	0	3	0
0	0	0	0	0	1	200.00	0	2	0	0	0	1	0	0	0	0	1
0	0	0	0	0	2	400.00	0	1	0	0	0	0	0	0	1	1	0
0	0	2	7	2	26	283.85	4	14	3	11	3	8	10	6	7	35	10
2	1	1	....	24	103	315.34	11	31	2	36	9	31	53	13	19	67	45
0	0	0	0	6	7	317.00	0	2	0	2	0	4	8	1	1	3	7
0	0	0	0	3	0	500.00	0	0	0	0	0	0	1	0	0	1	1
0	0	0	0	0	0	......	1	0	0	0	0	0	1	0	0	1	0
0	0	0	0	1	6	409.10	1	0	0	3	1	1	0	1	0	4	2
0	0	0	0	0	1	100.00	0	1	0	1	0	1	2	0	0	2	2
0	0	0	0	0	1	100.00	0	2	0	1	1	4	0	1	0	0	0
0	0	0	0	0	5	333.33	0	2	0	1	0	1	3	0	1	1	1
0	0	0	0	0	1	200.00	1	0	0	1	0	0	1	0	0	0	1
0	1	0	0	11	22	466.00	6	4	0	1	3	4	11	2	6	7	3
0	0	0	0	0	5	222.22	0	1	0	1	1	2	5	0	3	7	1
0	0	0	0	0	3	300.00	0	1	0	1	0	1	1	1	0	2	0
0	0	0	0	0	1	500.00	0	0	0	1	0	1	0	0	0	0	0
0	0	0	0	0	2	200.00	0	1	0	1	0	2	4	1	0	0	3
0	0	0	0	6	3	428.58	0	0	0	2	8	0	1	0	1	0	0
0	0	0	0	0	16	400.00	1	3	0	3	2	2	5	1	1	0	6
2	0	1	0	3	30	237.75	1	14	2	17	1	8	10	5	6	39	18
....	....	....	3	9	63	350.00	9	15	3	22	4	14	32	3	8	41	20
0	0	0	0	4	15	461.50	1	1	1	1	0	3	11	0	0	1	9
0	0	0	0	0	6	400.00	1	0	0	3	1	0	1	0	0	2	1
0	0	0	0	1	2	600.00	0	0	0	0	0	0	1	0	0	0	1
0	0	0	0	0	10	333.33	1	4	2	5	1	1	3	0	5	1	1
0	0	0	0	0	1	333.33	0	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	2	333.33	0	1	0	1	0	0	0	0	0	1	1
0	0	[illegible]	0	0	0	200.00	0	0	0	3	0	0	0	0	0	0	1
0	0	0	0	3	5	533.33	0	0	0	2	0	1	2	0	0	1	1
0	0	0	1	0	4	357.00	1	1	0	0	0	2	0	0	1	3	1
0	0	0	0	0	3	750.00	0	0	0	0	0	0	0	0	0	1	0
0	0	0	2	1	15	243.00	5	8	0	7	2	7	14	3	2	30	3
4	....	....	7	....	72	315.00	11	44	6	18	9	20	22	9	17	69	9
0	0	0	0	0	0	......	0	2	0	0	0	0	0	0	0	3	1
0	0	0	0	0	2	400.00	1	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	3	500.00	1	0	0	0	1	0	1	0	0	0	0

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.— *(Continued).*										
Oneonta	*5,000	18	43.20	11	61.1	0	0	0	0	0
Worcester	*3,000	7	28.00	2	28.6	0	0	0	0	0
Cazenovia	4,363	8	22.00	1	12.5	0	0	0	0	0
Brookfield	3,685	1	3.50	1	100.	0	0	0	0	0
Norwich	5,755	12	24.25	3	25.0	0	0	0	0	0
Hamilton	3,912	4	12.15	1	25.0	0	0	1	0	0
Skaneateles	4,866	1	2.50	1	100.	0	0	0	0	0
SYRACUSE	*78,000	114	17.54	48	42.1	0	0	4	3	0
Cortland	*7,361	16	24.72	4	25.0	0	0	1	0	0
Homer	3,000	4	16.00	0	....	0	0	0	0	0
Rest of District	....	136	......	33	24.2	0	0	10	2	0
WEST CENTRAL DIST.:										
Totals	....	260	......	77	30.2	1	...	5	4	....
AUBURN	*26,000	53	24.46	22	41.5	0	0	1	0	0
Ithaca	10,000	18	21.60	6	33.3	0	0	0	0	0
Waterloo	*4,500	8	21.33	2	25.0	0	0	0	0	0
Hector	5,000	4	9.60	1	25.0	0	0	0	0	0
Seneca Falls	*6,000	6	12.00	4	66.6	0	0	0	0	0
Manchester	*4,000	5	15.00	2	40.0	0	0	0	0	0
Phelps	*7,000	5	8.57	1	20.0	0	0	0	0	0
Canandaigua	6,300	11	20.95	4	36.4	0	0	1	1	0
Attica	3,100	3	11.63	0	....	0	0	1	1	0
Penn Yan	4,500	6	2.67	3	50.0	0	0	0	0	0
Rest of District	....	141	......	35	25.0	1	0	2	2	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	968	......	500	51.5	6	....	22	6	....
OSWEGO	*24,000	46	23.00	20	43.5	0	0	0	0	0
Richland	*4,000	7	.21.00	1	14.3	0	0	1	0	0
Fulton	*4,000	12	36.00	6	50.0	0	0	0	0	0
Clyde	*3,000	1	4.00	0	....	0	0	0	0	0
Lyons	*6,000	10	20.00	5	50.0	0	0	0	0	0
Newark	*3,500	5	17.15	2	40.0	0	0	0	0	0
Palmyra	*4,800	6	15.00	3	50.0	0	0	0	0	0
ROCHESTER	*110,000	166	18.00	68	40.3	0	0	2	1	0
Brockport	*4,500	5	14.00	1	20.0	0	0	0	0	0
Albion	*5,000	7	16.80	5	71.5	0	0	1	0	0
LOCKPORT	*15.000	21	17.00	7	33.3	0	0	1	0	0
BUFFALO	*202,818	†489	31.34	328	67.1	5	0	10	4	0
Tonawanda	*4,900	12	29.00	6	50.0	0	0	0	0	0
Aurora	3,000	4	16.00	3	75.0	0	0	0	0	0
Rest of District	....	177	......	45	30.0	1	0	7	1	0
Totals for the State	....	9,042	......	4,130	...	41	....	194	98	6

† For four weeks

REMARKS.—The total reported mortality for the month is 9,042 (nearly 2,500 less than in
were 2,950 deaths, or 383.30 per 1,000 total mortality. Of these 283.70 per 1,000 total mortality
small-pox four deaths occurred in New York and two in the Kings County Hospital; an
the close of the month up to the issue of this bulletin. The appearance at quarantine,
boards of health to be more scrupulous regarding cleanliness, although there is no
death rate per 1,000 is 102.80, and 188.60 per 1,000 above five years of age. The combined

NOTE.—For boundaries of Sanitary Districts see Annual Summary.

AUGUST — *(Concluded).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	3	0	9	666.60	0	3	0	0	0	2	0	0	0	1	0
0	0	0	0	0	1	142.85	0	0	0	2	0	1	0	0	0	2	1
1	0	0	0	0	0	125.00	0	1	0	0	0	0	0	2	1	3	0
0	0	0	0	0	1	1000.	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	3	250.00	1	2	0	0	0	1	0	0	1	4	0
0	0	0	0	0	1	500.00	1	0	0	0	0	0	0	0	0	1	0
0	0	0	1	0	0	1000.	0	0	0	0	0	0	0	0	0	0	0
1	0	0	3	0	22	288.75	2	21	6	10	4	8	12	2	11	5	0
0	0	0	0	0	4	315.00	0	3	0	0	0	1	0	0	2	5	0
0	0	0	0	0	0	.....	0	1	0	0	0	1	0	0	0	2	0
2	0	0	0	0	26	294.75	5	11	0	5	3	6	9	5	2	43	7
....	1	1	1	8	67	340.00	8	15	3	13	13	10	29	11	7	50	13
0	1	0	0	0	21	416.00	2	4	1	1	2	3	9	4	0	2	2
0	0	0	0	0	4	222.22	0	0	0	1	3	0	2	1	0	4	3
0	0	0	0	0	1	125.00	1	0	0	1	0	0	1	0	1	3	0
0	0	0	0	0	1	250.00	0	0	0	0	0	0	1	0	0	2	0
0	0	0	0	0	3	500.00	0	0	0	0	0	0	1	0	0	2	0
0	0	0	0	0	1	200.00	0	1	0	0	0	0	0	0	0	2	1
0	0	0	0	0	1	200.00	0	1	0	1	0	0	0	1	0	1	0
0	0	1	0	3	1	627.27	1	1	0	0	0	0	0	0	1	0	1
0	0	0	0	0	0	666.66	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	1	166.66	0	1	0	0	0	2	2	0	0	0	0
0	0	0	1	5	33	300.00	4	7	2	9	8	5	13	5	5	34	5
11	9	3	4	21	275	368.00	36	84	5	68	20	34	95	17	30	89	133
0	0	1	0	0	14	326.00	1	5	1	0	1	0	9	0	4	2	8
0	0	0	0	0	0	142.85	0	2	0	0	0	0	1	0	0	3	0
0	0	0	0	0	6	500.00	0	0	0	1	0	1	1	0	0	3	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	5	500.00	0	1	0	0	0	0	0	0	0	4	0
0	0	0	0	0	1	200.00	1	0	0	0	0	0	0	0	0	2	1
0	5	0	0	0	2	333.33	0	1	0	2	0	0	0	0	0	0	1
1	0	1	0	7	29	253.00	11	19	0	13	9	5	20	3	9	20	16
0	0	0	0	0	1	200.00	0	0	0	0	0	0	0	0	0	3	1
0	0	0	0	2	2	714.50	0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	476.20	2	3	0	1	1	4	0	2	0	1	6
9	9	0	1	9	172	438.00	15	30	1	38	6	17	52	4	11	9	87
1	0	0	0	0	4	416.65	0	1	0	0	0	1	2	0	1	0	1
0	0	0	0	0	2	500.00	0	0	0	0	0	0	0	0	0	1	1
0	0	1	3	3	37	300.00	6	22	3	13	3	6	10	8	5	40	8
55	24	16	57	302	2,158	......	457	926	67	665	361	442	933	199	354	731	956

ending August 27.

July); the percentage of deaths under five years is 45.3 From zymotic diseases there were from diarrhœal diseases; 21.46 from typhoid fever; 33.42 from diphtheria. From outbreak of the disease has appeared in Edgewater, eleven cases being reported toward in the port of New York, on September 23, of cholera, from Naples, will cause local immediate prospect of the disease securing a foothold here. From consumption the death ratio from consumption, zymotic and puerperal disease is 438.00.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT: Totals	....	4,950	......	2,227	45.0	17	....	89	93	10
NEW YORK CITY	*1,481,920	3,045	25.35	1,354	45.0	17	0	53	43	5
BROOKLYN	*757,755	1,366	23.54	691	47.1	0	0	21	36	0
Gravesend	*5,000	16	38.40	6	37.5	0	0	0	0	0
New Utrecht	4,742	9	23.00	2	22.2	0	0	0	3	0
LONG ISLAND CITY	*21,000	61	34.85	28	46.5	0	0	0	3	0
Newtown	*10,000	29	34.80	13	43.4	0	0	0	2	0
Oyster Bay	*12,000	26	26.00	9	34.5	0	0	0	0	0
Hempstead	18,160	21	14.00	6	30.0	0	0	0	0	0
North Hempstead	8,000	14	21.00	6	42.8	0	0	0	0	0
Huntington	8,100	8	12.00	2	25.0	0	0	1	0	0
Jamaica	10,089	20	24.00	8	40.0	0	0	0	1	0
Southold	7,267	13	23.00	3	23.0	0	0	1	0	0
Sag Harbor	3,000	1	4.00	0	....	0	0	0	0	0
Edgewater	*10,000	25	30.00	10	40.0	0	0	1	1	4
Northfield	7,014	12	20.57	6	50.0	0	0	0	0	0
Westfield	7,000	10	17.14	3	30.0	0	0	0	0	0
YONKERS	*26,000	45	20.77	20	44.4	0	0	0	2	0
Westchester	*6,900	13	22.50	7	47.5	0	0	0	0	0
Port Chester	*4,000	7	21.00	0	....	0	0	0	0	0
Sing Sing	*6,500	13	24.00	8	61.4	0	0	1	0	0
New Rochelle	*5,500	9	19.64	5	55.5	0	0	0	0	0
Rest of District	....	187	......	40	25.0	0	0	11	2	1
HUDSON VALLEY DIST.: Totals	....	821	. ....	247	31.0	6	....	35	9	0
ALBANY	*96,000	148	18.75	41	27.7	1	0	5	0	0
COHOES	*20,000	46	27.60	17	37.0	1	0	2	0	0
TROY	*65,000	143	26.40	52	36.3	4	0	7	0	0
West Troy	*13,000	29	26.00	12	41.3	0	0	0	0	0
Lansingburgh	*9,700	18	22.26	3	16.7	0	0	0	0	0
Green Island	*5,000	6	14.40	2	33.3	0	0	1	0	0
Greenbush	*7,200	11	18.33	3	27.3	0	0	1	0	0
Coxsackie	4,000	7	21.00	3	42.8	0	0	0	1	0
Catskill	*4,600	9	23.48	4	44.4	0	0	0	1	0
HUDSON	*9,000	8	10.67	2	25.0	0	0	0	0	0
KINGSTON	*21,100	27	14.41	15	55.5	0	0	0	1	0
Wawarsing	8,555	5	7.00	2	40.0	0	0	0	1	0
Rosendale	5,000	8	19.20	0	....	0	0	4	0	0
Marbletown	4,000	3	9.00	2	66.6	0	0	0	0	0
Saugerties	4,000	11	33.33	6	54.5	0	0	0	0	0
POUGHKEEPSIE	*20,200	29	17.30	6	19.3	0	0	0	0	0
Fishkill	10,732	11	12.25	4	36.4	0	0	0	0	0
Wappinger Falls	*5,000	3	7.20	1	33.3	0	0	0	0	0
NEWBURGH	*20,000	20	12.00	6	30.0	0	0	1	0	0
Port Jervis	*9,500	12	15.18	6	50.0	0	0	1	2	0
Middletown	*10,000	14	16.80	3	21.4	0	0	1	0	0
Goshen	4,387	9	24.62	2	22.2	0	0	0	0	0
Haverstraw	7,000	2	3.43	2	100.0	0	0	0	0	0
Nyack	5,000	6	14.40	1	16.7	0	0	1	0	0
Ramapo	5,000	8	19.20	3	37.5	0	0	0	0	0
Rest of District	....	228	......	49	23.5	0	0	11	3	0

† For four weeks

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns during September, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
53	8	7	29	363	633	280.00	504	652	28	299	272	287	367	114	194	270	661
30	7	4	22	190	417	262.00	337	404	21	158†	189†	179†	253	76†	133	185	322
16	1	3	5	130	155	250.00	137	172	7	111	61	73	61	22	45	33	277
0	0	0	0	2	1	187.50	0	1	0	1	1	1	5	0	1	0	3
0	0	0	0	1	1	555.55	0	1	0	0	1	0	1	0	0	0	1
2	0	0	0	6	10	333.50	3	9	0	4	1	6	3	2	2	2	8
0	0	0	1	2	5	333.00	0	7	0	4	0	1	2	3	0	0	2
0	0	0	0	1	3	200.00	1	5	0	1	1	4	2	1	1	2	4
0	0	0	0	1	1	100.00	1	4	0	0	3	2	2	1	1	3	2
0	0	0	0	2	3	357.15	0	1	0	0	0	1	3	0	0	2	2
0	0	0	0	0	1	250.00	1	3	0	0	0	0	2	0	0	0	0
0	0	0	0	6	4	550.00	0	1	0	1	2	0	1	0	0	3	1
0	0	0	0	1	0	153.70	0	2	0	0	0	4	1	1	0	1	2
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	1	3	400.00	0	2	0	0	0	4	1	2	2	1	3
0	0	0	1	0	4	416.67	2	0	0	0	0	0	0	0	0	3	2
0	0	0	0	3	0	300.00	0	2	0	1	0	0	1	0	0	3	0
0	0	0	0	4	5	244.44	7	3	0	2	4	1	7	1	5	0	4
0	0	0	0	1	3	307.40	1	1	0	2	2	1	0	0	0	1	1
0	0	0	0	0	2	285.71	1	0	0	1	0	1	1	0	0	1	0
0	0	0	0	4	0	385.00	2	1	0	0	0	0	1	0	1	0	3
0	0	0	0	2	0	222.22	2	0	0	0	0	0	1	0	1	1	2
5	0	0	0	6	15	220.00	9	33	0	12	7	9	19	5	2	29	22
8	3	....	7	76	79	276.00	57	98	4	61	24	70	68	21	41	97	57
3	0	0	0	12	10	209.00	12	24	0	13	3	24	11	6	8	9	7
0	0	0	0	7	6	360.00	6	3	1	2	1	3	1	1	0	7	4
0	0	0	0	16	22	342.65	16	18	0	9	3	10	18	1	7	4	8
0	0	0	0	8	4	413.80	4	1	0	1	2	0	3	1	3	0	2
0	0	0	0	1	2	166.67	1	5	0	1	1	2	1	0	0	3	1
0	0	0	0	0	1	333.33	1	0	0	1	0	0	0	0	0	1	1
0	0	0	0	1	0	181.82	1	3	0	2	0	2	0	0	0	0	1
0	0	0	0	2	1	571.43	0	1	1	0	0	0	0	0	0	1	0
0	0	0	0	3	0	444.44	0	0	0	0	0	2	1	2	0	0	0
0	0	0	0	0	0	......	0	1	0	0	0	2	1	0	2	2	0
0	3	0	2	4	5	555.55	2	0	0	2	1	2	2	1	1	1	0
0	0	0	0	0	2	600.00	0	1	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	500.00	2	1	1	0	0	0	0	0	0	0	0
0	0	0	1	0	1	666.66	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	7	0	626.26	0	1	0	0	0	1	0	0	0	0	2
1	0	0	0	4	0	172.41	0	4	0	2	0	2	4	1	1	10	0
0	0	0	1	0	0	......	0	3	0	1	0	1	1	0	3	0	1
0	0	0	1	0	0	333.33	1	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	3	2	1	0	0	3	4	2	1	0	3
0	0	0	0	1	0	333.33	0	0	0	0	0	0	1	0	2	1	4
0	0	0	0	0	1	142.85	0	0	0	2	0	0	2	0	1	5	2
0	0	0	0	0	1	111.11	0	2	0	1	0	1	1	0	0	1	2
0	0	0	0	1	0	500.00	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	166.67	0	2	0	0	0	0	0	0	0	2	1
0	0	0	0	3	0	375.00	0	0	0	0	0	0	1	0	1	1	2
4	0	0	2	6	23	200.00	8	25	0	24	13	15	13	6	11	48	16

ending October 1.

MONTHLY BULLETIN FOR

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals..................	....	265	......	66	25.0	4	....	16	2	....
Argyle	3,700	4	13.00	0	....	2	0	0	0	0
Greenwich................	3,861	6	18.62	1	16.7	0	0	0	0	0
Fort Ann	4,267	2	6.00	1	50.0	0	0	0	0	0
Fort Edward	4,880	6	14.50	1	16.7	0	0	0	0	0
Glens Falls...............	10,000	15	18.00	3	20.0	0	0	0	0	0
Crown Point..............	4,287	3	8.40	0	....	0	0	0	0	0
Fort Henry...............	2,525	4	19.00	0	....	0	0	0	0	0
Malone....................	7,918	10	15.23	2	20.0	0	0	1	0	0
Potsdam..................	*4,000	8	24.00	4	50.0	0	0	0	0	0
OGDENSBURGH............	*11,000	16	17.36	6	37.5	0	0	1	0	0
Gouverneur	5,500	9	19.63	4	44.5	0	0	1	0	0
Ellisburgh.	4,811	5	12.25	0	....	0	0	0	0	0
Plattsburgh	*7,000	9	15.43	4	44.5	0	0	0	0	0
WATERTOWN	12,200	19	18.85	3	15.9	0	0	0	0	0
Clayton	4,314	7	19.53	2	28.6	0	0	0	0	0
Rest of District	....	142	......	35	18.0	2	0	12	2	0
MOHAWK VALLEY DIST.:										
Totals..................	....	426	......	100	20.0	...	....	22	2	....
SCHENECTADY.............	15,000	47	37.60	15	31.9	0	0	0	0	0
Schoharie.................	3,350	7	25.10	2	28.5	0	0	1	0	0
Cobleskill................	3,371	2	7.10	0	....	0	0	0	0	0
Middleburgh	3,376	4	14.25	0	....	0	0	0	0	0
AMSTERDAM...............	*14,000	21	18.00	10	47.6	0	0	1	0	0
Johnstown................	*6,000	6	12.00	1	16.7	0	0	0	0	0
Gloversville	10,000	9	10.80	3	33.3	0	0	0	0	0
Little Falls	7,200	2	......	1	50.0	0	0	1	0	0
UTICA	*40,000	85	25.50	20	23.5	0	0	4	0	0
ROME.......................	12,045	14	14.00	2	14.3	0	0	2	0	0
Boonville	4,000	6	18.00	0	....	0	0	0	0	0
Camden...................	3,400	2	7.06	0	....	0	0	0	0	0
Waterford	4,326	9	24.90	4	44.5	0	0	0	1	0
Ballston Spa	3,200	5	18.75	2	40.0	0	0	0	0	0
Saratoga Springs	10,000	34	40.80	8	23.6	0	0	3	1	0
Rest of District	....	173	......	34	20 0	0	0	10	0	0
SOUTHERN TIER DIST.:										
Totals..................	....	238	......	56	23.0	....	....	19	9	....
BINGHAMTON	*25,000	37	17.76	10	27.0	0	0	3	1	0
Owego....................	6,000	12	24.00	2	16.7	0	0	2	0	0
Candor....................	4,323	8	22.20	3	37.5	0	0	1	0	0
Waverly	3,000	5	20.00	2	40.0	0	0	0	0	0
ELMIRA	*25,000	27	13.00	10	38.5	0	0	1	0	0
Horseheads.......	3,500	4	13.71	1	25.0	0	0	1	0	0
Hornellsville..............	10,000	6	7.20	1	16.7	0	0	0	0	0
Bath.......................	3,500	5	17.14	0	...	0	0	1	0	0
Corning..................	*8,000	11	16.50	3	27.3	0	0	1	3	0
JAMESTOWN...............	*14,000	12	10.30	3	25.0	0	0	1	0	0
Rest of District...........	....	111	......	21	25.0	0	0	8	5	0
EAST CENTRAL DIST.:										
Totals..................	....	306	......	67	22.0	....	...	13	5	....
Walton...................	3,541	7	23.72	0	....	0	0	0	0	0
Delhi.....................	3,000	7	28.00	1	12.8	0	0	0	0	0
Cooperstown	*3,000	4	16.00	0	....	0	0	0	0	0

SEPTEMBER — *(Continued)*.

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
1	....	2	....	11	33	250.00	17	26	1	14	5	15	23	9	6	58	23
0	0	0	0	0	0	500.00	0	1	1	0	0	0	0	0	0	0	0
1	0	0	0	0	0	333.33	0	1	0	2	0	0	0	0	0	1	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	2	0	1	0	0	1	0	0	1	1
0	0	1	0	0	0	66.66	2	3	0	0	0	1	3	2	0	0	3
0	0	0	0	0	0	......	0	2	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	......	1	0	0	0	0	1	0	0	0	2	0
0	0	0	0	1	1	200.00	1	1	0	1	0	1	1	0	0	2	0
0	0	0	0	4	0	500.00	0	0	0	2	0	1	0	0	0	1	0
0	0	0	0	0	2	187.00	0	3	0	0	0	1	3	0	2	1	3
0	0	0	0	3	1	555.55	0	0	0	0	1	0	0	0	0	1	2
0	0	0	0	0	0	......	1	0	0	0	0	0	0	1	0	3	0
0	0	0	0	0	2	222.22	1	0	0	0	0	0	1	0	0	3	2
0	0	0	0	0	0	......	1	2	0	0	1	0	3	1	0	8	3
0	0	0	0	0	2	285.72	0	0	0	0	0	1	0	1	1	2	0
0	0	1	0	3	24	330.00	9	11	0	8	2	9	11	4	3	32	9
4	1	1	1	36	35	230.00	25	40	1	29	14	32	38	21	14	75	35
0	0	0	0	11	5	320.00	1	3	0	1	1	4	10	0	3	2	6
0	0	0	0	2	0	428.57	0	1	0	0	0	0	1	0	0	2	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	......	0	1	0	0	0	1	1	0	1	0	0
0	0	0	0	2	2	238.10	0	1	0	5	0	1	0	1	1	4	3
0	0	0	0	0	1	166.67	0	0	0	0	0	1	1	0	0	3	0
0	0	0	0	0	1	111.11	0	1	0	1	0	2	1	1	0	0	2
0	0	1	0	0	0	1000.	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	10	2	200.00	11	11	0	5	5	8	10	4	2	7	5
0	0	0	0	1	1	285.71	0	2	0	0	0	0	1	3	1	2	1
0	0	0	0	0	0	......	0	2	0	1	0	1	0	0	0	2	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	1	1	0	333.33	2	0	0	0	1	1	0	0	0	0	2
0	0	0	0	0	0	....	1	0	0	1	0	0	1	0	0	0	2
2	0	0	0	2	4	352.90	1	5	0	2	1	1	4	3	0	4	1
1	1	0	0	7	19	195.00	9	13	1	13	6	12	8	9	6	47	11
3	....	....	....	6	26	250.00	10	24	2	16	4	8	26	11	14	38	22
0	0	0	0	1	1	162.16	3	5	1	3	2	2	3	2	1	1	8
0	0	0	0	0	1	250.00	0	3	0	0	1	0	0	1	0	3	1
0	0	0	0	1	3	625.00	0	1	0	0	0	0	0	1	0	1	0
1	0	0	0	0	0	200.00	0	2	0	1	0	0	1	0	0	0	0
0	0	0	0	0	3	115.85	1	2	1	2	0	1	2	3	2	5	4
0	0	0	0	0	0	250.00	0	0	0	1	0	0	0	1	0	1	0
0	0	0	0	1	1	833.33	0	0	0	0	0	0	1	0	1	1	1
0	0	0	0	0	0	200.00	1	1	0	0	0	0	0	0	0	1	1
0	0	0	0	1	2	627.27	2	1	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	83.83	0	1	0	3	0	3	2	1	0	0	1
2	0	0	0	2	15	300.00	3	8	0	5	1	2	17	2	10	25	6
....	....	1	1	7	28	183.00	21	27	3	24	6	27	29	9	19	69	17
0	0	0	0	0	0	......	1	1	0	0	0	0	1	0	0	4	0
0	0	0	0	0	2	285.71	1	0	0	0	0	0	0	1	1	2	0
0	0	0	0	0	0	......	0	0	0	1	1	0	0	0	0	2	0

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.—*(Continued)*:										
Oneonta	*5,000	14	33.60	5	35.7	0	0	0	0	0
Worcester	*3,000	13	52.00	5	38.1	0	0	0	0	0
Cazenovia	4,363	5	11.00	0	....	0	0	0	0	0
Brookfield	3,685	2	6.52	0	....	0	0	0	0	0
Norwich	5,755	10	20.85	3	30.0	0	0	0	0	0
Hamilton	3,912	2	6.15	0	....	0	0	0	0	0
Skaneateles	4,866	5	10.00	0	....	0	0	0	0	0
SYRACUSE	*78,000	89	13.70	25	27.8	0	0	3	4	0
Cortland	*4,361	16	42.66	6	37.5	0	0	1	0	0
Homer	3,000	7	24.00	0	....	0	0	1	0	0
Rest of District	....	76	......	12	15.8	0	0	6	1	0
WEST CENTRAL DIST.:										
Totals	....	267	......	57	21.0	1	....	16	5	....
AUBURN	*26,000	54	24.92	17	30.6	0	0	6	3	0
Groton	3,450	1	3.50	1	100.0	0	0	0	0	0
Ithaca	10,000	8	9.60	0	....	0	0	1	0	0
Waterloo	*4,500	5	13.33	2	40.0	0	0	0	0	0
Hector	5,000	4	9.60	0	....	0	0	0	0	0
Seneca Falls	*6,000	10	20.00	3	30.0	1	0	0	0	0
Manchester	*4,000	5	15.00	2	40.0	0	0	0	1	0
Phelps	*7,000	7	12.00	2	28.5	0	0	0	0	0
Geneva	*6,000	11	22.00	2	18.2	0	0	0	0	0
Penn Yan	4,500	4	10.62	0	....	0	0	0	0	0
Le Roy	5,000	8	19.20	0	....	0	0	0	0	0
Rest of District	....	150	......	28	18.7	0	0	9	1	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	994	......	396	39.5	10	....	39	16	....
OSWEGO	*24,000	19	9.50	6	31.6	0	0	0	0	0
Richland	*4,000	10	30.00	2	20.0	0	0	1	0	0
Fulton	*4,000	8	24.00	2	25.0	0	0	0	0	0
Clyde	*3,000	6	24.00	4	66.6	0	0	0	0	0
Lyons	*6,000	9	18.00	5	55.5	0	0	0	0	0
Newark	*3,500	4	13.71	1	25.0	0	0	1	0	0
Palmyra	*4,800	8	20.00	1	12.5	0	0	0	0	0
Wolcott	5,753	3	6.28	0	....	0	0	0	0	0
ROCHESTER	*110,000	175	19.20	59	33.7	0	0	9	2	0
Brockport	*4,500	3	8.00	1	33.3	0	0	0	0	0
Albion	*5,000	8	17.20	1	12.5	0	0	0	1	0
LOCKPORT	*15,000	13	10.40	1	7.7	0	0	0	0	0
BUFFALO	*202,818	†484	24.82	259	52.7	6	0	16	5	0
Tonawanda	*4,900	14	34.30	6	42.8	1	0	4	0	0
Rest of District	....	230	......	48	20.8	3	0	8	8	0
Totals for the State	....	8,267	......	3,218	....	38	....	248	141	10

† For five weeks

REMARKS.—The total reported mortality for the month is 8,267; the percentage of
261.15 per 1,000 total mortality. Of these 122.05 per 1,000 total mortality were from diarrhœal
in New York, Edgewater and the Kings County Hospital; the disease has been reported
diseases. From consumption the death rate per 1,000 is 118.55, and 195.80 per 1,000 above
diseases is 385.14. The death-rate from acute respiratory diseases is 83.70.

NOTE.—For boundaries of Sanitary Districts see Annual Summary.

SEPTEMBER — (*Concluded*).

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	0	3	214.30	1	1	0	0	0	1	2	0	0	1	5
0	0	0	0	3	3	461.54	0	0	0	1	0	0	0	0	2	2	2
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	2	2	1
0	0	0	0	0	0	......	0	0	0	0	0	2	0	0	0	0	0
0	0	0	1	0	2	300.00	0	2	1	0	0	0	1	1	0	2	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	2	1	1	0
0	0	1	0	1	6	167.00	12	9	2	11	2	12	10	1	7	7	1
0	0	0	0	0	2	187.50	0	2	0	1	0	1	1	0	1	4	3
0	0	0	0	0	0	166.67	1	0	0	0	1	0	0	0	1	3	0
0	0	0	0	2	6	165.00	3	4	0	4	2	10	8	2	2	22	4
....	....	....	1	9	32	230.84	13	28	....	16	5	9	26	11	8	62	25
0	0	0	0	0	11	370.37	2	5	0	4	2	4	6	2	2	4	3
0	0	0	0	0	1	1000.	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	125.00	0	2	0	0	0	1	0	0	0	4	0
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	3	1
0	0	0	0	0	1	250.00	0	0	0	0	0	1	1	0	1	0	0
0	0	0	0	0	1	200.00	0	1	0	0	0	1	0	0	0	4	2
0	0	0	0	1	0	400.00	1	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	1	142.85	1	2	0	0	0	0	0	0	0	2	1
0	0	0	0	0	1	91.90	2	3	0	0	1	1	0	0	1	1	1
0	0	0	0	0	0	......	0	0	0	2	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	1	0	1	0	0	1	1	1	3	0
0	0	0	1	8	16	233.30	6	14	0	9	2	1	18	8	3	39	15
14	4	....	5	51	143	280.00	50	85	6	63	22	55	145	36	35	96	119
0	0	0	0	0	1	52.62	0	1	0	0	1	0	8	2	2	2	2
0	0	0	0	2	1	400.00	0	0	0	0	0	1	1	0	0	4	0
0	0	0	0	0	2	250.00	1	2	0	0	0	1	0	0	0	1	1
0	0	0	0	0	4	666.67	0	0	0	1	0	0	1	0	0	0	0
0	0	0	0	0	4	444.44	0	0	0	1	0	1	1	0	0	1	1
0	0	0	0	0	0	250.00	0	0	0	0	0	0	1	1	1	0	0
0	0	0	0	0	0	......	0	2	0	2	0	0	0	1	0	3	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	2	0
0	0	0	2	10	26	280.00	6	24	1	10	6	14	26	12	6	8	13
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	1	1	0
0	0	0	0	0	1	250.00	0	0	0	1	0	2	0	1	0	2	0
0	0	0	0	0	1	77.00	3	1	0	1	1	2	0	1	1	0	2
6	4	0	2	34	79	336.72	32	31	4	27	11	20	82	9	17	12	87
5	0	0	0	0	0	642.85	0	0	1	0	0	0	1	0	0	0	2
3	0	0	1	5	24	226.00	8	22	0	20	3	†14	24	9	7	†60	†11
83	16	11	44	559	1,000	......	697	980	45	522	352	503	722	232	331	765	959

ending October 1.

deaths under five years being 39.0. From zymotic diseases there were 2,159 deaths, or
diseases; 29.15 from typhoid fever; 67.62 from diphtheria. Deaths from small-pox occurred
from no new locality. There is an increase in the number of deaths from malarial
the age of five years. The combined death ratio from consumption, zymotic and puerperal

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	4,564	......	1,655	36.3	19	....	78	68	4
NEW YORK CITY	*1,481,920	2,787	23.76	1,012	36.3	16	0	38	33	2
BROOKLYN	*757,755	1,319	20.88	518	39.4	0	0	28	30	0
Gravesend	*5,000	6	14.50	1	16.0	0	0	0	0	0
New Utrecht	4,742	15	37.80	9	60.0	0	0	0	0	0
LONG ISLAND CITY	*21,000	48	27.43	24	50.0	1	0	1	1	0
Newtown	*10,000	15	18.00	5	33.3	1	0	0	0	0
Oyster Bay	*12,000	13	13.00	3	23.0	0	0	0	0	0
Hempstead	18,160	15	10.00	1	6.6	0	0	0	0	0
North Hempstead	8,000	3	4.50	1	33.3	0	0	0	0	0
Jamaica	10,089	12	14.40	5	41.6	0	0	0	0	0
Southold	7,267	13	21.37	2	15.4	0	0	0	0	0
Sag Harbor	3,000	5	20.00	1	20.0	0	0	0	0	0
Edgewater	*10,000	22	26.40	8	36.4	0	0	0	0	2
Northfield	7,014	11	18.86	2	18.2	0	0	0	0	0
Westfield	7,000	10	17.14	4	40.0	0	0	1	0	0
YONKERS	*26,000	35	16.15	9	25.7	0	0	0	1	0
Westchester	*6,900	7	12.17	2	28.6	0	0	0	0	0
Mount Vernon	8,000	11	16.50	3	27.3	0	0	0	0	0
Port Chester	*4,000	3	9.00	1	33.3	0	0	0	0	0
Sing Sing	*6,500	15	27.68	3	20.0	0	0	0	1	0
New Rochelle	*5,500	15	32.72	3	20.0	0	0	0	0	0
Rest of District	....	184	......	38	20.6	1	0	10	2	0
HUDSON VALLEY DIST.:										
Totals	....	743	......	193	26.0	8	....	33	5	....
ALBANY	*96,000	152	19.00	39	25.8	0	0	7	0	0
TROY	*65,000	126	23.26	44	34.9	6	0	9	0	0
West Troy	*13,000	28	25.84	7	25.0	0	0	2	0	0
Hoosick Falls	6,000	20	40.00	8	40.0	0	0	0	0	0
Lansingburgh	*9,700	15	18.55	5	33.3	0	0	0	0	0
Green Island	*5,000	11	26.40	6	54.6	0	0	0	0	0
Greenbush	*7,200	17	28.33	9	52.9	2	0	0	0	0
Coxsackie	4,000	6	18.00	2	33.3	0	0	0	0	0
Catskill	*4,500	10	26.66	1	10.0	0	0	0	1	0
HUDSON	*10,000	9	10.80	1	11.1	0	0	0	0	0
KINGSTON	*21,100	32	18.19	8	25.0	0	0	0	0	0
Ellenville	3,000	5	20.00	0	....	0	0	1	0	0
Rosendale	5,000	7	16.80	1	14.2	0	0	2	0	0
Marbletown	4,000	5	15.00	1	20.0	0	0	0	0	0
Esopus	4,736	3	8.00	1	33.3	0	0	0	0	0
Saugerties	*4,000	8	24.00	3	37.5	0	0	0	0	0
POUGHKEEPSIE	*20,200	25	15.00	7	28.5	0	0	0	0	0
Wappinger Falls	*5,000	2	4.80	1	50.0	0	0	0	0	0
NEWBURGH	*20,000	29	17.40	5	17.2	0	0	1	1	0
Port Jervis	*9,500	11	13.89	3	27.2	0	0	0	0	0
Middletown	*10,000	8	9.60	2	25.0	0	0	1	0	0
Goshen	4,387	11	30.00	2	18.2	0	0	0	0	0
Nyack	5,000	6	14.50	1	16.7	0	0	0	0	0
Ramapo	5,000	8	19.20	3	37.5	0	0	1	0	0
Rest of District	....	189	......	33	17.3	0	0	9	3	0

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns during October, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
82	10	10	11	428	200	198.70	634	629	34	268	276	257	465	131	183	286	491
44	10	7	8	228	141	189.00	411	425	19	134	190	143	269	92	130	204	243
29	0	3	3	149	49	220.45	181	152	9	108	65	78	151	27	39	24	194
1	0	0	0	0	0	166.67	1	1	0	0	0	0	1	0	2	0	0
0	0	0	0	0	1	66.66	4	0	1	0	1	0	2	0	0	1	5
3	0	0	0	10	3	395.83	4	4	1	2	1	4	0	1	4	4	4
0	0	0	0	2	1	266.67	1	2	0	2	0	0	0	1	0	1	4
1	0	0	0	0	0	76.92	1	1	0	0	0	1	4	0	0	4	1
1	0	0	0	4	0	333.33	2	4	0	0	0	0	0	0	0	3	1
0	0	0	0	0	0	......	1	0	0	0	0	0	0	1	0	0	1
0	0	0	0	4	0	333.33	0	0	0	1	1	1	0	1	0	2	2
0	0	0	0	0	0	......	2	1	1	0	1	0	3	0	0	4	1
0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	0	2	1
0	0	0	0	6	0	363.64	2	1	0	1	2	0	1	0	0	1	5
0	0	0	0	0	3	......	1	1	1	1	0	1	1	0	0	4	1
0	0	0	0	1	0	200.00	1	1	0	0	0	6	0	0	0	0	0
1	0	0	0	6	0	228.57	3	2	0	2	2	6	6	1	1	1	3
0	0	0	0	0	1	142.85	2	0	0	0	1	0	0	0	0	2	1
0	0	0	0	2	0	181.81	0	3	1	1	1	0	0	0	0	1	2
1	0	0	0	0	0	333.33	0	1	0	0	0	0	0	0	0	1	0
0	0	0	0	4	0	333.33	1	2	0	1	1	1	2	1	0	1	0
0	0	0	0	5	0	333.33	1	0	0	2	0	0	3	1	0	1	2
1	0	0	0	7	4	135.84	15	27	1	13	10	15	21	5	7	25	20
13	....	1	....	83	22	222.07	65	99	7	44	29	91	65	13	22	91	52
3	0	0	0	13	1	157.85	12	33	0	8	3	38	11	4	3	11	5
0	0	0	0	15	4	270.00	17	14	2	7	6	14	12	2	1	5	12
1	0	0	0	4	3	257.14	5	0	0	1	0	5	2	1	3	1	0
0	0	0	0	6	2	400.00	0	3	0	0	0	3	3	0	1	1	1
0	0	0	0	2	0	133.33	0	2	0	1	2	1	0	0	0	4	3
0	0	0	0	4	2	545.45	1	0	0	0	1	0	0	0	0	2	1
2	0	0	0	4	0	470.58	0	3	0	3	0	1	0	0	0	1	1
0	0	0	0	5	0	833.33	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	1	200.00	0	1	0	0	0	0	4	0	0	2	1
0	0	0	0	1	0	111.11	0	2	0	1	0	3	0	0	1	1	0
0	0	1	0	4	1	187.85	3	3	3	2	2	5	2	0	4	2	0
0	0	0	0	0	0	200.00	0	0	0	1	0	1	0	0	1	1	0
0	0	0	0	0	0	285.71	0	0	0	0	0	0	0	0	0	0	5
0	0	0	0	0	1	200.00	1	0	0	1	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	0	0	2	0	1	0	0	0	0	0
0	0	0	0	4	0	500.00	1	0	0	0	0	0	1	0	0	1	1
4	0	0	0	3	0	280.00	2	3	0	1	0	1	2	0	2	5	2
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	0	1
0	0	0	0	0	1	103.45	4	5	0	1	3	0	4	1	1	5	2
0	0	0	0	1	0	91.91	0	0	0	0	0	2	0	1	1	1	5
0	0	0	0	0	0	125.00	1	0	0	1	1	1	1	0	0	1	1
0	0	0	0	1	0	91.90	2	2	0	0	0	0	2	0	0	3	1
0	0	0	0	0	0	......	1	2	1	0	1	0	0	0	0	0	1
0	0	0	0	1	0	250.00	0	2	0	0	1	0	0	0	0	1	2
3	0	0	0	15	6	190.00	15	23	1	14	9	15	21	4	4	40	[illegible]

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.—*(Continued)*:										
Oneonta	*5,000	5	12.00	1	20.0	0	0	0	0	0
Worcester	*3,000	1	4.00	0	....	0	0	0	0	0
Cazenovia..................	4,363	8	22.00	0	....	0	0	0	0	0
Brookfield	3,685	7	22.80	1	14.3	0	0	0	0	0
Norwich..................	5,500	12	26.18	1	8.3	0	0	0	1	0
Hamilton	3,912	9	27.68	1	11.1	0	0	2	0	0
Baldwinsville	3,000	2	8.00	1	50.0	0	0	1	0	0
Skaneateles	4,866	1	2.46	0	....	0	0	0	0	0
SYRACUSE	*78,000	112	17.23	26	23.2	0	0	2	3	0
Homer..................	3,000	8	32.00	1	12.5	0	0	1	0	0
Rest of District............	....	122	......	7	5.7	1	0	9	2	0
WEST CENTRAL DIST.:										
Totals..................	....	169	......	24	14.1	2	....	8	3	...
AUBURN..................	*26,000	27	12.46	4	14.8	0	0	2	1	0
Groton	3,450	2	7.00	0	....	0	0	0	0	0
Ithaca	10,000	10	12.00	2	20.0	0	0	2	1	0
Waterloo	*4,500	5	13.34	0	....	0	0	0	0	0
Hector..................	5,000	5	12.00	0	....	0	0	0	0	0
Seneca Falls..................	*6,000	10	20.00	0	....	0	0	1	0	0
Manchester..................	*4,000	1	3.00	1	100.0	0	0	0	0	0
Phelps	*7,000	4	6.85	2	50.0	0	0	0	0	0
Geneva..................	*6,000	4	8.00	1	25.0	0	0	0	0	0
Penn Yan	4,500	1	2.70	0	....	0	0	0	0	0
Dansville	3,700	7	22.70	2	28.5	0	0	0	0	0
Rest of District............	....	93	......	12	12.8	2	0	3	1	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals..................	....	779	......	257	....	6	....	23	8	....
OSWEGO	*24,000	31	15.50	7	22.5	0	0	1	0	0
Richland..................	*4,000	5	15.00	1	20.0	0	0	0	0	0
Fulton	*4,000	3	9.00	2	66.6	1	0	0	0	0
Clyde	*3,000	4	16.00	1	25.0	0	0	0	0	0
Lyons	*6,000	11	22.00	1	9.1	0	0	0	1	0
Newark..................	*3,500	4	13.70	0	....	0	0	0	0	0
Palmyra	*4,800	5	12.50	1	20.0	0	0	0	0	0
Wolcott	5,753	3	6.26	0	....	1	0	0	0	0
ROCHESTER	*110,000	177	19.31	58	32.0	0	0	9	1	0
Brockport	*4,500	2	5.34	0	....	0	0	0	0	0
Medina..................	*4,000	6	18.00	4	66.6	1	0	0	0	0
Albion..................	5,000	6	14.40	1	16.7	0	0	0	0	0
LOCKPORT	*15,000	9	7.20	1	11.1	0	0	0	0	0
BUFFALO	*202,818	†346	22.18	149	43.1	3	0	8	4	0
Tonawanda..................	*4,900	9	21.00	4	44.4	0	0	1	0	0
Amherst	4,578	7	18.35	2	28.5	0	0	0	0	0
Rest of District............	....	151	......	25	18.0	0	0	4	2	0
Totals for the State.....	....	7,370	......	2,317	....	38	....	182	104	4

† For four weeks

REMARKS.—The total reported mortality for the month is 7,370; the percentage of
201.63 per 1,000 total mortality. Of these 40.19 per 1,000 total mortality were from diarrhœal
thirty-nine towns not specified in the bulletin, more than a single death occurring in
Granby. Small-pox is reported from no new locality. From consumption the death
death ratio from consumption, zymotic and puerperal diseases is 336.51. The death-rate
population of which is 3,710,500, the annual death-rate per 1,000 population for the

NOTE.—For boundaries of Sanitary Districts see Annual Summary.

OCTOBER — *(Concluded).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	0	1	200.00	0	0	0	1	0	0	0	1	1	0	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	1	0	125.00	1	2	0	0	0	0	0	0	1	3	0
0	0	0	0	0	0	......	0	0	0	0	0	1	0	1	0	4	1
0	0	0	0	0	1	166.67	0	1	0	2	2	0	1	1	0	3	0
0	0	0	0	0	0	222.22	0	1	0	0	0	0	2	1	0	2	1
0	0	0	0	0	0	500.00	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	......	0	1	0	0	0	[illegible]	0	0	0	0	0
1	0	0	0	7	2	112.92	14	10	2	4	6	20	15	5	9	10	2
0	0	0	0	0	0	125.00	1	0	0	0	0	1	0	1	0	3	1
2	0	0	1	0	2	138.80	6	14	1	9	2	4	15	6	3	33	12
....	....	....	....	9	4	152.85	12	20	1	12	6	14	14	5	10	32	17
0	0	0	0	2	0	185.00	0	6	0	2	0	2	3	1	2	2	4
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	1	0
0	0	0	0	1	0	400.00	1	1	0	0	1	0	2	0	0	0	1
0	0	0	0	0	0	......	1	0	0	0	0	2	1	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	1	3	0
0	0	0	0	0	0	166.67	2	3	0	0	0	2	0	1	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	0	0	2
0	0	0	0	0	1	250.00	0	0	0	1	0	2	0	0	0	0	0
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	0	0
0	0	0	0	3	0	428.57	1	0	0	0	0	1	0	0	1	1	0
0	0	0	0	3	3	128.00	7	9	1	8	4	3	8	3	6	23	9
14	5	....	2	82	38	......	56	85	3	54	19	39	111	15	39	79	101
0	0	0	0	2	2	161.50	1	4	0	1	1	4	6	0	2	3	4
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	2	2
0	0	0	0	0	0	333.33	0	0	0	1	0	0	1	0	0	0	0
0	0	0	0	0	1	250.00	0	0	0	0	0	1	1	0	0	1	0
0	0	0	0	0	0	91.90	0	1	0	1	0	3	0	0	1	2	2
0	0	0	0	0	0	......	0	1	0	0	1	0	1	0	0	1	0
0	0	0	0	0	0	......	0	0	1	0	0	0	2	0	0	2	0
0	0	0	0	0	0	333.33	0	1	0	0	1	0	0	0	0	0	0
1	1	0	1	14	4	......	13	21	1	7	0	11	25	6	.8	13	41
0	0	0	0	0	0	......	0	0	0	0	1	0	1	0	0	0	0
0	0	0	0	0	2	333.33	0	1	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	1	3	0
0	0	0	0	0	0	......	1	2	0	0	1	1	0	0	2	1	1
7	4	0	1	57	20	300.00	33	30	1	21	9	9	59	6	16	10	48
2	0	0	0	0	1	444.45	1	1	0	1	0	0	1	1	0	0	0
2	0	0	0	0	0	285.71	0	1	0	1	0	0	0	1	0	2	0
2	0	0	0	9	8	180.00	7	22	0	21	5	10	11	1	9	38	2
113	15	13	14	707	297	......	853	942	53	458	367	475	759	207	309	717	743

ending October 29.

mortality under five years being 31.3. From zymotic diseases there were 1,487 deaths, or
diseases; 24.38 from typhoid fever; 96.04 from diphtheria. Diphtheria is reported from
Flatbush, Patterson, Warrensburgh, Stradford, Whitestown, Shelden, Greece and
ratio per 1,000 is 127.65, and 186.54 per 1,000 above the age of five years. The combined
from acute respiratory diseases is 116.21. Of 125 reporting localities, the aggregate
month is 19.82.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	4,540	......	1,545	34.0	10	....	63	61	4
NEW YORK CITY	*1,481,920	2,759	22.62	975	35.3	9	0	26	25	2
BROOKLYN	*757,755	1,350	22.20	465	34.0	0	0	27	29	0
Gravesend	*5,000	3	7.20	2	66.6	0	0	0	0	0
New Utrecht	4,742	15	36.00	4	27.8	0	0	0	2	0
LONG ISLAND CITY	*21,000	45	25.71	15	33.3	0	0	0	0	0
Oyster Bay	*12,000	14	14.00	2	14.3	0	0	0	0	0
Hempstead	18,160	24	16.00	4	16.7	0	0	0	1	0
North Hempstead	8,000	9	15.00	4	40.0	0	0	0	0	0
Huntington	8,100	9	13.50	1	11.1	0	0	0	0	0
Jamaica	10,089	13	15.60	6	46.1	0	0	0	0	0
Southold	7,267	7	12.00	1	14.3	0	0	0	0	0
Sag Harbor	3,000	1	4.00	0	....	0	0	0	0	0
New Brighton	15,000	22	17.60	6	27.2	0	0	0	0	0
Edgewater	*12,000	22	22.00	7	33.8	1	0	1	0	0
Northfield	7,014	9	15.43	1	11.1	0	0	2	0	0
Westfield	7,000	8	13.71	2	25.0	0	0	0	0	0
YONKERS	*26,000	35	16.60	9	25.4	0	0	0	0	0
Westchester	*6,900	11	19.13	3	27.3	0	0	0	0	0
Port Chester	4,000	3	9.00	0	....	0	0	0	0	0
Sing Sing	*6,500	9	16.62	3	33.3	0	0	0	0	0
New Rochelle	†5,500	8	17.45	3	37.5	0	0	0	0	0
Rest of District	....	164	......	31	18.8	0	0	7	2	2
HUDSON VALLEY DIST.:										
Totals	....	827	......	232	28.0	11	....	24	8	....
ALBANY	*96,000	166	20.75	44	26.5	1	0	7	0	0
COHOES	*20,000	44	23.40	20	45.5	0	0	2	0	0
TROY	*65,000	124	22.89	47	37.8	8	0	2	0	0
West Troy	*13,000	23	21.23	12	52.3	0	0	3	0	0
Lansingburgh	*9,700	17	21.03	5	29.4	0	0	2	0	0
Green Island	*5,000	10	24.00	5	50.0	1	0	0	0	0
Greenbush	*7,200	16	26.67	8	50.0	0	0	0	0	0
Coxsackie	4,000	6	18.00	2	33.3	0	0	0	0	0
Catskill	*4,500	6	16.00	0	....	0	0	0	0	0
HUDSON	*10,000	12	14.40	0	....	0	0	0	0	0
KINGSTON	*21,000	25	14.30	10	40.0	0	0	0	4	0
Rosendale	5,000	7	16.80	2	28.5	0	0	0	3	0
Marbletown	4,000	3	9.00	1	33.3	1	0	0	1	0
Esopus	4,736	6	15.21	2	33.3	0	0	0	0	0
Saugerties	*4,000	8	24.00	3	37.5	0	0	0	0	0
POUGHKEEPSIE	*20,200	47	27.92	9	19.2	0	0	0	0	0
Fishkill	10,732	12	14.00	5	41.7	0	0	0	0	0
Wappinger Falls	*5,000	2	5.00	0	....	0	0	0	0	0
NEWBURGH	*20,000	30	18.00	4	13.3	0	0	1	0	0
Port Jervis	*9,500	12	15.15	3	25.0	0	0	0	0	0
Middletown	*10,000	13	15.60	1	8.3	0	0	0	0	0
Goshen	4,387	11	30.00	5	45.4	0	0	0	1	0
Nyack	5,000	6	14.40	1	16.7	0	0	0	0	0
Ramapo	5,000	12	28.80	4	33.3	0	0	0	0	0
Rest of District	....	188	......	31	16.0	0	0	7	2	0

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns, during November, 1887.

populations preceding by a star (*) are estimated to date; the remainder are from the of 1880].

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
89	22	15	13	518	82	193.17	790	634	39	229	290	266	442	93	167	315	398
55	22	10	7	279	64	181.80	489	419	25	134	192	162	228	56	116	223	216
25	0	4	6	185	15	215.15	239	173	9	71	73	87	163	24	38	31	151
0	0	0	0	0	0	......	1	0	0	2	0	0	0	0	0	0	0
0	0	0	0	2	0	277.78	3	0	0	0	0	1	2	1	1	1	2
4	0	0	0	4	0	177.78	9	5	0	1	2	5	4	0	1	6	2
0	0	0	0	0	0	......	2	2	1	1	1	0	0	1	1	3	2
0	0	0	0	9	0	416.67	2	0	0	1	2	1	1	0	0	5	2
0	0	0	0	0	0	......	3	1	0	0	0	0	1	0	0	2	2
0	0	0	0	0	0	......	2	0	0	0	0	1	2	1	0	2	1
0	0	0	0	3	1	307.70	1	0	0	1	0	0	4	0	1	1	1
1	0	0	0	0	0	142.85	2	1	0	1	0	0	1	0	0	0	1
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	0	0
2	0	0	0	5	0	318.18	1	2	1	3	2	1	2	3	0	0	0
0	0	0	0	4	1	317.18	4	0	0	0	0	1	4	1	0	3	2
0	0	0	0	1	0	333.33	1	2	0	1	1	0	0	0	0	1	0
0	0	0	0	1	1	250.00	0	2	0	1	0	0	0	0	2	1	0
0	0	0	0	6	0	171.43	5	6	1	0	4	2	3	1	1	3	3
0	0	0	0	4	0	363.36	1	3	1	0	1	0	0	0	0	1	0
0	0	0	0	0	0	......	0	1	0	0	0	1	1	0	0	0	0
0	0	1	0	3	0	444.44	0	1	0	1	0	0	0	0	1	1	1
0	0	0	0	0	0	......	2	0	0	0	1	0	1	1	1	1	1
2	0	0	0	12	0	152.45	23	16	1	11	10	4	25	4	4	30	11
21	1	2	2	103	12	222.48	89	107	3	40	23	80	66	20	41	100	74
3	1	0	0	20	6	228.90	22	26	2	7	5	30	8	5	9	10	4
1	0	0	0	7	0	225.25	5	8	0	5	0	2	4	0	0	1	9
1	0	0	0	24	3	306.45	16	15	0	5	4	15	9	3	6	3	10
0	0	0	0	6	0	391.70	5	4	0	1	0	1	2	0	0	0	1
0	0	0	0	2	0	235.25	2	3	0	0	1	0	1	1	2	1	2
0	0	0	0	1	0	200.00	0	1	0	0	2	0	0	0	0	1	4
8	0	0	0	0	0	500.00	1	1	0	0	1	2	0	0	1	1	1
1	0	0	0	2	0	500.00	1	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	2	2	0	1	1	0
0	0	0	0	0	0	......	0	4	0	1	0	2	0	1	0	2	2
0	0	0	1	3	0	320.00	4	2	0	2	1	2	3	0	1	2	0
0	0	0	0	0	0	428.56	1	0	0	1	0	1	0	0	0	0	1
0	0	0	0	0	0	666.66	0	0	0	0	0	0	0	0	1	0	0
1	0	0	0	0	0	166.67	0	0	0	1	1	1	0	0	0	1	1
0	0	0	0	5	0	625.00	0	1	0	1	0	0	1	0	0	0	0
5	0	0	0	1	1	148.88	5	5	0	2	2	3	1	1	5	8	8
0	0	0	0	2	1	250.00	0	4	0	0	0	1	0	0	0	1	3
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	1	0
1	0	0	0	1	0	100.00	4	5	0	2	0	1	3	1	2	6	3
0	0	0	1	1	0	166.67	2	2	0	1	0	0	0	0	1	0	4
0	0	0	0	0	0	......	1	2	0	0	1	2	4	1	0	1	1
0	0	0	0	4	0	454.54	0	1	0	0	0	2	1	0	0	2	0
0	0	1	0	0	0	166.67	0	1	0	0	0	1	1	0	0	2	0
0	0	0	0	3	0	250.00	2	2	0	0	0	0	0	0	0	3	2
0	0	1	0	18	1	152.63	15	16	1	11	5	13	24	7	9	44	14

MONTHLY BULLETIN FOR

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DIST.:										
Totals	....	242	......	54	22.1	1	....	13	....	....
Argyle	3,700	3	9.80	0	....	0	0	0	0	0
Greenwich	3,861	4	12.45	0	....	0	0	0	0	0
Salem	3,500	5	17.14	0	....	0	0	1	0	0
Fort Ann	4,267	3	8.45	0	....	0	0	1	0	0
Fort Edward	4,880	9	22.13	1	11.1	0	0	0	0	0
Glens Falls	10,000	18	21.60	8	44.5	0	0	1	0	0
Crown Point	4,287	4	11.20	1	25.0	0	0	0	0	0
Malone	7,918	7	10.63	1	14.3	0	0	0	0	0
Potsdam	*4,000	8	24.00	3	37.5	0	0	0	0	0
OGDENSBURGH	*11,000	23	25.09	6	26.1	0	0	0	0	0
Ellisburgh	4,811	5	12.50	0	....	0	0	0	0	0
WATERTOWN	12,200	19	18.92	5	26.3	0	0	1	0	0
Cape Vincent	3,143	3	11.85	0	....	0	0	0	0	0
Lowville	3,188	3	11.25	1	33.3	0	0	0	0	0
Clayton	4,314	3	8.38	1	33.3	0	0	1	0	0
Rest of District	....	125	......	27	22.0	1	0	8	0	0
MOHAWK VALLEY DIST.:										
Totals	....	325	......	50	15.3	1	....	11	3	....
SCHENECTADY	*20,000	39	23.40	9	23.1	0	0	2	0	0
Schoharie	3,350	8	28.67	1	12.5	0	0	0	0	0
Cobleskill	3,371	1	3.60	0	....	0	0	0	0	0
AMSTERDAM	*14,000	40	34.60	4	10.0	0	0	1	0	0
Johnstown	*6,000	10	20.00	1	10.0	0	0	1	0	0
Gloversville	10,000	8	9.60	2	25.0	0	0	2	0	0
Little Falls	7,200	4	6.67	0	....	0	0	1	0	0
UTICA	*40,000	58	17.40	11	19.0	0	0	1	0	0
ROME	12,045	18	18.00	2	11.1	1	0	0	0	0
Boonville	4,000	3	9.00	1	33.3	0	0	0	0	0
Camden	3,400	4	14.12	0	....	0	0	0	0	0
Waterford	4,326	5	13.75	0	....	0	0	0	0	0
Ballston Spa	3,200	2	7.85	0	....	0	0	0	0	0
Saratoga Springs	10,000	20	24.00	6	30.0	0	0	1	0	0
Rest of District	....	105	......	13	12.8	0	0	2	3	0
SOUTHERN TIER DIST.:										
Totals	....	207	......	22	11.0	3	....	9	2	....
BINGHAMTON	*25,000	25	12.00	3	12.0	1	0	1	0	0
Owego	6,000	7	14.00	1	....	0	0	0	0	0
Candor	4,323	2	5.75	0	....	0	0	0	0	0
Waverly	3,000	1	4.00	0	....	0	0	0	0	0
ELMIRA	*25,000	37	17.76	6	16.2	0	0	3	1	0
Horseheads	3,500	5	17.15	0	....	0	0	1	0	0
Hornellsville	10,000	8	9.60	0	....	0	0	0	0	0
Corning	*8,000	12	18.00	5	41.7	0	0	1	0	0
Olean	8,000	6	9.00	2	33.3	0	0	1	1	0
JAMESTOWN	*14,000	10	8.57	1	10.0	0	0	0	0	0
Westfield	3,000	4	16.00	0	....	0	0	1	0	0
Fredonia	3,000	1	4.00	0	....	0	0	0	0	0
Rest of District	....	89	......	4	44.5	2	0	1	0	0
EAST CENTRAL DIST.:										
Totals	....	252	......	39	15.5	1	....	7	3	....
Walton	3,541	2	6.80	0	....	0	0	0	0	0
Delhi	3,000	4	16.00	0	....	0	0	0	0	0

NOVEMBER — (*Continued*).

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
7	1	2	1	32	6	262.50	15	28	5	13	6	14	18	6	7	39	28
0	0	1	0	0	0	333.33	0	0	0	0	0	1	0	0	0	1	0
0	0	0	0	1	0	250.00	0	0	0	0	1	0	0	1	1	0	0
0	0	0	0	0	0	200.00	0	1	0	0	0	0	0	0	0	3	0
0	0	0	0	0	0	333.33	0	0	0	0	0	1	0	0	0	0	1
0	0	0	0	1	0	111.11	0	1	0	2	0	0	2	0	0	2	1
5	0	0	1	1	0	444.45	1	2	1	1	0	2	2	0	0	1	0
0	0	0	0	0	0	......	1	0	0	1	0	1	1	0	0	0	0
0	0	0	0	0	0	......	1	0	0	2	0	1	0	0	1	1	1
0	0	0	0	4	0	500.00	0	2	0	0	0	0	0	0	0	1	1
1	0	0	0	3	0	173.85	5	2	0	0	1	3	2	0	0	0	6
0	0	0	0	0	0	......	0	0	0	0	1	1	2	0	0	1	0
0	0	0	0	0	0	52.23	0	4	0	0	0	0	0	1	1	5	7
0	0	0	0	0	0	......	0	1	0	1	1	0	0	0	0	0	0
0	1	0	0	0	0	333.33	0	0	0	0	0	0	1	0	0	1	0
0	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	1	0	1
1	0	1	0	22	6	314.50	7	15	4	6	2	4	8	4	3	23	10
....	....	....	....	49	5	212.30	23	48	4	15	11	20	29	12	14	54	26
0	0	0	0	9	0	282.05	1	9	0	2	1	3	4	1	0	1	6
0	0	0	0	6	0	850.00	0	1	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	12	1	350.00	4	4	1	1	2	1	4	1	3	3	2
0	0	0	0	0	0	100.00	0	3	0	1	0	1	1	0	1	1	1
0	0	0	0	0	0	250.00	1	0	1	1	0	2	0	0	0	1	0
0	0	0	0	0	0	250.00	0	0	0	0	0	0	0	1	0	2	0
0	0	0	0	9	1	189.75	7	14	1	1	3	7	5	3	2	2	2
0	0	0	0	1	0	111.11	1	1	0	1	0	1	1	2	0	7	2
0	0	0	0	0	0	......	2	1	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	250.00	0	0	0	1	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	1	0	1	0	0	0	0	2	0	1
0	0	0	0	0	0	......	1	0	0	0	0	1	0	0	0	0	0
0	0	0	0	3	0	200.00	2	2	0	2	0	0	4	0	1	4	1
0	0	0	0	8	3	160.00	4	11	1	4	5	4	10	4	5	31	10
....	....	1	3	13	3	158.70	16	25	3	16	6	22	19	7	14	31	14
0	0	0	0	0	0	80.00	2	4	0	1	1	4	1	1	2	2	5
0	0	0	0	1	0	143.28	0	1	0	0	0	0	0	0	0	5	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	1	1	162.16	6	6	1	2	1	5	2	2	4	0	2
0	0	0	0	0	0	200.00	0	1	0	0	0	1	0	0	0	2	0
0	0	0	1	1	0	250.00	0	2	0	2	0	0	1	0	0	0	1
0	0	0	0	5	1	583.33	1	0	0	1	0	0	0	0	0	2	1
0	0	0	0	1	0	500.00	0	0	0	0	0	1	1	1	0	0	0
0	0	0	0	0	0	......	2	2	1	2	0	1	0	0	1	1	0
0	0	0	0	0	0	250.00	0	0	0	2	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	0
0	0	1	2	4	1	122.22	5	9	1	6	4	10	14	3	6	15	5
1	1	2	....	18	....	132.00	30	36	6	16	10	29	17	5	4	60	6
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
0	0	0	0	0	0	......	1	0	0	0	0	0	1	1	0	1	0

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
EAST CENTRAL DIST.— *(Continued):*										
Cooperstown	*3,000	3	12.00	1	33.3	0	0	0	0	0
Worcester	*3,000	9	36.00	3	33.3	0	0	0	0	0
Cazenovia	4,363	8	22.00	1	12.5	0	0	0	0	0
Brookfield	3,685	6	19.46	0	....	0	0	2	0	0
Norwich	5,500	9	19.64	1	11.1	0	0	0	1	0
Hamilton	3,912	4	12.30	0	....	0	0	0	0	0
Skaneateles	4,866	4	10.00	0	....	0	0	0	0	0
SYRACUSE	*78,000	81	12.46	20	39.5	0	0	1	1	0
Cortland	4,361	4	11.00	1	25.0	1	0	0	0	0
Homer	3,000	5	20.00	0	....	0	0	1	1	0
Rest of District	....	113	......	12	10.6	0	0	3	1	0
WEST CENTRAL DIST.:										
Totals	....	171	......	22	13.0	....	....	2	1	....
AUBURN	*26,000	23	10.62	7	26.1	0	0	0	0	0
Groton	3,450	6	21.16	0	....	0	0	0	0	0
Ithaca	10,000	11	13.20	1	18.1	0	0	1	0	0
Waterloo	*4,500	4	10.07	1	25.0	0	0	0	0	0
Hector	5,000	4	9.60	1	25.0	0	0	0	0	0
Seneca Falls	*6,000	1	......	0	....	0	0	0	0	0
Manchester	*4,000	5	15.00	0	....	0	0	0	0	0
Phelps	*7,000	4	7.00	2	50.0	0	0	0	0	0
Attica	3,100	3	12.00	0	....	0	0	0	0	0
Penn Yan	4,500	5	13.00	0	....	0	0	0	0	0
Dansville	3,700	3	8.00	0	....	0	0	0	0	0
Rest of District	....	102	......	10	10.0	0	0	1	1	0
LAKE ONTARIO AND WESTERN DIST.:										
Totals	....	728	......	207	28.2	2	....	20	2	....
OSWEGO	*24,000	39	19.50	9	23.1	1	0	0	0	0
Richland	*4,000	6	18.00	2	33.3	0	0	0	0	0
Fulton	*4,000	8	24.00	2	25.0	0	0	0	0	0
Clyde	*3,000	6	24.00	0	....	0	0	0	0	0
Lyons	*6,000	8	16.00	1	12.5	0	0	0	1	0
Palmyra	*4,800	10	25.00	1	10.0	0	0	2	0	0
Wolcott	5,753.	4	9.00	1	25.0	0	0	0	0	0
ROCHESTER	*110,000	146	15.92	46	31.5	0	0	5	0	0
Brockport	*4,500	8	21.33	2	25.0	0	0	0	0	0
Mendon	3,200	8	30.00	3	37.5	0	0	0	0	0
Medina	*4,000	6	18.00	0	....	0	0	0	0	0
Albion	5,000	8	19.10	3	25.0	0	0	0	0	0
LOCKPORT	*15,000	8	6.40	1	12.5	0	0	1	0	0
BUFFALO	*202,818	†294	18.85	108	36.7	1	0	6	1	0
Tonawanda	*4,900	11	26.93	3	27.3	0	0	2	0	0
Rest of District	....	158	......	25	15.6	0	0	4	0	0
Totals for the State	....	7,292	......	2,171	....	29	....	149	80	4

† For four weeks

REMARKS.— The total reported mortality for the month is 7,292; the percentage of
or 200.00 per 1,000 total mortality. Of these 16.00 per 1,000 total mortality were from
year being 60.54. In the 120 specified localities diphtheria is reported from sixty,
of the deaths were from this cause; about 60 per cent of the zymotic mortality is from
house: the origin is traced to New York. From consumption the death ratio per 1,000
consumption, zymotic and puerperal diseases is 336.00. The death-rate from acute

NOTE.— For boundaries of Sanitary Districts see Annual Summary.

NOVEMBER — *(Concluded).*

Scarlet fever.	Measles.	Eyrsipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	0	0	......	1	1	0	0	0	0	0	0	0	0	1
0	0	0	0	6	0	666.66	2	0	0	0	0	0	0	0	9	1	0
1	0	0	0	0	0	125.00	0	1	0	1	0	2	0	0	0	3	0
0	0	0	0	0	0	333.33	0	0	0	0	0	0	1	0	0	3	0
0	0	0	0	0	0	111.11	0	0	0	2	2	0	0	1	0	2	1
0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	0	1	1
0	0	0	0	0	0	......	0	1	0	1	0	0	0	0	0	1	1
0	1	2	0	9	0	174.20	12	13	6	5	3	13	6	1	4	4	0
0	0	0	0	1	0	500.00	0	1	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	200.00	0	0	0	1	0	1	0	1	0	1	0
0	0	0	0	2	0	53.10	14	18	0	6	5	12	9	1	0	40	2
....	....	1	....	8	....	70.58	9	13	2	10	7	16	17	10	8	54	13
0	0	0	0	2	0	87.00	3	3	1	0	1	4	1	2	1	3	3
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	1	4	0
0	0	0	0	1	0	181.81	0	0	0	0	2	2	0	2	1	1	1
0	0	9	0	0	0	.....	0	0	0	1	0	1	1	0	0	0	1
0	0	0	0	1	0	250.00	0	0	0	0	0	0	0	1	0	2	0
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	......	1	0	0	1	0	1	1	0	0	1	0
0	0	0	0	0	0	......	0	1	0	0	1	0	2	0	0	0	0
0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	1	0
0	0	0	0	0	0	333.33	0	2	0	1	0	0	0	0	0	2	0
0	0	0	0	1	0	333.33	0	0	0	1	0	0	1	0	0	0	0
0	0	1	0	3	0	60.00	6	6	1	6	2	8	9	5	5	40	8
12	5	2	3	103	9	216.45	69	73	5	31	22	52	101	25	46	65	81
1	0	1	0	2	1	153.84	9	5	0	0	3	1	3	0	2	2	8
0	0	0	0	2	0	333.33	0	0	0	1	0	0	0	0	0	3	0
0	0	0	0	2	0	250.00	0	0	0	1	0	0	1	0	0	2	2
0	0	0	0	0	0	......	0	0	0	0	1	0	0	3	1	1	0
0	0	0	0	0	0	125.00	1	2	0	0	0	0	0	0	2	1	1
0	0	0	0	0	0	200.00	2	1	0	0	0	0	1	0	0	3	1
0	0	0	0	0	0	......	1	0	0	0	0	0	0	1	0	2	2
0	0	0	0	24	1	205.48	12	17	1	8	7	15	23	3	8	2	20
0	0	0	0	0	0	......	2	1	0	0	0	0	1	0	1	3	0
0	0	0	0	2	0	250.00	1	2	0	0	0	0	0	3	0	0	0
0	0	0	0	0	0	......	2	1	1	0	0	1	0	1	0	0	0
0	0	0	0	4	0	500.00	1	1	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	125.00	0	1	0	0	0	3	1	0	0	0	2
5	2	0	3	44	3	217.00	31	24	1	15	5	24	51	9	20	13	36
1	0	0	0	2	0	454.54	1	0	1	1	0	0	0	0	1	0	2
5	3	1	0	21	4	237.50	6	18	1	5	6	8	20	5	11	32	8
130	30	25	22	844	117	......	1,041	964	67	370	375	499	709	178	301	718	640

ending November 26.

mortality under five years being 29.7. From zymotic diseases there were 1,421 deaths,
diarrhœal diseases; 20.00 from typhoid fever; 115.62 from diphtheria, the average for the
causing about 12 per cent of all deaths; in the smaller towns not specified, 8.5 per cent
diphtheria. Small-pox has recently appeared in Albany, at present limited to one
is 132.05, and 188.22 per 1,000 above the age of five years. The combined death ratio from
respiratory diseases is 144.58. In Oneonta no deaths occurred during the month.

MONTHLY BULLETIN OF THE NEW

Abstract of Reports of Deaths and their Causes in the

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The census

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
MARITIME DISTRICT:										
Totals	....	5,036	......	1,833	36.5	13	....	43	63	11
NEW YORK CITY	*1,481,920	3,043	24.58	1,140	37.4	12	0	22	30	1
BROOKLYN	*757,755	1,454	23.01	558	38.3	0	0	15	26	1
Gravesend	*5,000	6	14.40	1	16.66	0	0	0	0	0
New Utrecht	4,742	10	25.22	3	30.0	1	0	0	0	0
LONG ISLAND CITY	*21,000	44	25.14	20	45.4	0	0	0	0	0
Newtown	*10,000	27	32.40	14	51.8	0	0	1	0	0
Oyster Bay	*12,000	14	14.00	3	21.4	0	0	0	0	0
Hempstead	18,160	27	18.00	7	25.9	0	0	1	1	0
North Hempstead	8,000	11	14.50	3	27.27	0	0	0	0	0
Huntington	8,100	7	10.37	3	42.8	0	0	0	0	0
Jamaica	10,089	8	9.60	4	50.0	0	0	0	0	0
Southold	7,267	13	22.22	3	23.0	0	0	0	0	0
New Brighton	*15,000	31	18.13	7	23.0	0	0	0	0	0
Edgewater	12,000	26	26.00	5	19.2	0	0	0	1	0
Northfield	7,014	20	34.34	2	10.0	0	0	2	0	0
Westfield	7,000	7	12.00	1	14.3	0	0	0	0	0
YONKERS	*26,000	42	19.38	16	38.1	0	0	1	2	0
Westchester	*6,900	7	12.17	0	....	0	0	0	1	0
Mount Vernon	*8,000	14	21.00	8	57.1	0	0	0	0	0
Port Chester	4,000	4	12.00	0	....	0	0	0	0	0
Sing Sing	*6,500	9	19.63	0	....	0	0	0	1	0
New Rochelle	*5,500	9	19.63	2	22.2	0	0	0	0	0
Rest of District	....	202	......	33	11.0	0	0	1	1	9
HUDSON VALLEY DIST.:										
Totals	....	898	......	224	25.0	7	....	22	9	1
ALBANY	*96,000	177	22.12	43	24.29	2	0	7	0	1
COHOES	*20,000	28	18.80	7	25.0	0	0	1	0	0
TROY	*65,000	152	28.00	55	36.00	2	0	2	0	0
West Troy	*13,000	26	24.00	9	34.61	0	0	1	0	0
Hoosick Falls	*6,000	1	2.00	0	....	0	0	1	0	0
Lansingburgh	*9,700	25	31.00	7	28.0	0	0	3	0	0
Green Island	*5,000	11	26.40	3	27.2	1	0	0	0	0
Greenbush	*7,200	13	21.66	8	61.53	0	0	0	0	0
Coxsackie	4,000	5	15.00	0	....	0	0	0	0	0
Catskill	*4,500	6	16.00	1	16.66	0	0	0	0	0
HUDSON	*10,000	34	40.80	7	20.58	0	0	0	0	0
KINGSTON	*21,000	23	13.14	7	30.43	0	0	0	1	0
Ellenville	3,000	4	16.00	3	75.0	0	0	0	0	0
Rosendale	5,000	5	12.00	1	20.0	0	0	0	0	0
Marbletown	4,000	2	6.00	1	50.0	0	0	0	0	0
Saugerties	*4,000	4	12.00	2	50.0	0	0	0	0	0
POUGHKEEPSIE	*20,200	41	24.35	13	31.7	0	0	0	0	0
Wappinger Falls	*5,000	4	9.60	0	....	0	0	0	1	0
NEWBURGH	*20,000	27	16.20	6	22.2	0	0	1	0	0
Port Jervis	*9,500	10	12.62	0	....	0	0	0	0	0
Middletown	*10,000	20	24.00	5	25.0	0	0	1	0	0
Goshen	4,387	5	14.30	1	20.0	0	0	0	0	0
Nyack	5,000	8	19.20	2	25.0	0	0	0	2	0
Ramapo	5,000	12	28.80	5	41.7	0	0	0	0	0
Rest of District	....	255	......	38	14.8	2	0	5	5	0

† For four weeks

YORK STATE BOARD OF HEALTH.

following Districts, Cities and Towns during December, 1887.

populations preceded by a star (*) are estimated to date; the remainder are from the of 1880.]

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
156	29	24	16	572	57	196.00	926	685	53	†273	†312	†298	499	123	171	304	408
99	24	14	10	315	43	187.30	569	438	35	157	211	181	278	74	119	201	210
46	5	7	4	207	12	215.12	290	167	14	73	77	90	166	35	40	37	143
0	0	0	0	0	0	......	2	1	0	2	0	0	0	0	0	0	1
0	0	0	0	0	0	100.00	1	0	0	1	0	0	2	1	0	1	3
3	0	0	0	4	0	159.15	7	7	0	2	4	0	0	2	1	6	8
0	0	0	0	0	0	37.10	8	1	0	2	0	0	5	1	2	2	5
0	0	0	0	3	0	214.28	2	2	0	0	0	1	1	0	0	0	5
2	0	0	0	7	0	407.40	4	2	0	1	0	1	4	1	1	2	0
0	0	0	0	1	1	181.81	0	2	0	0	1	2	0	1	0	0	3
0	0	0	0	2	0	285.71	0	0	0	0	0	0	0	1	0	3	1
1	0	0	0	3	0	500.00	0	1	0	0	0	0	0	0	1	1	1
3	0	0	0	1	1	555.55	2	0	0	0	1	0	0	1	0	3	1
1	0	0	0	2	0	98.50	4	7	0	3	1	4	3	1	0	4	1
0	0	0	0	6	0	268.40	4	6	0	3	0	0	0	0	0	3	3
0	0	0	0	2	0	200.00	1	6	0	0	2	3	2	1	0	1	0
0	0	1	0	0	0	142.75	2	1	0	1	1	1	0	0	0	0	0
0	0	0	0	7	0	238.09	5	5	1	3	3	3	9	0	0	0	3
0	0	0	0	0	0	142.85	0	2	0	2	0	2	0	0	0	0	0
1	0	0	0	1	0	250.00	1	1	1	2	1	0	2	0	1	0	3
0	0	0	0	0	0	......	1	0	0	1	2	0	0	0	0	0	0
0	0	0	0	1	0	222.22	2	2	0	2	0	1	0	0	0	0	0
0	0	0	0	1	0	111.11	1	0	0	2	1	1	0	0	0	3	0
0	0	2	2	9	0	120.00	20	34	2	16	7	8	27	4	6	37	17
27	2	3	1	103	7	202.20	96	125	7	53	33	108	69	27	34	113	61
13	1	1	0	14	0	220.33	19	27	0	10	13	38	7	5	4	10	5
0	0	0	0	4	1	214.28	2	4	1	2	0	2	3	1	0	1	6
3	0	1	0	28	0	233.30	21	22	1	7	8	14	19	2	3	8	11
0	0	0	0	10	0	423.07	5	7	0	1	0	1	0	0	0	0	1
0	0	0	0	0	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	4	0	280.00	6	2	0	2	1	1	2	1	0	3	0
0	0	0	0	1	0	181.81	1	1	1	0	0	0	2	1	2	0	1
2	0	0	0	6	0	615.38	1	0	0	1	1	1	1	0	0	0	0
0	0	0	0	1	0	200.00	0	1	0	1	0	0	1	0	0	1	0
0	0	0	0	0	1	166.66	1	2	0	0	0	0	1	0	0	0	1
0	0	0	0	0	0	......	7	10	0	4	1	2	5	2	2	1	0
0	0	1	0	1	0	130.43	8	1	2	0	2	3	1	0	2	1	0
8	0	0	0	2	0	500.00	0	0	0	0	0	1	0	0	0	0	1
0	1	0	0	0	0	200.00	1	0	0	2	0	0	1	0	0	0	0
1	0	0	0	0	0	......	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	250.00	0	1	0	0	0	0	0	1	0	0	1
0	0	0	0	2	0	243.80	2	2	0	4	2	4	8	1	1	6	1
0	0	0	0	0	0	250.00	0	0	0	1	0	1	0	0	0	1	0
0	0	0	0	2	0	148.14	1	4	0	0	1	4	3	1	2	3	4
0	0	0	0	0	0	......	0	0	0	1	0	2	0	1	3	1	2
0	0	0	0	1	0	100.00	1	5	0	2	0	0	4	0	1	3	2
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	4	0
0	0	0	0	0	0	250.00	0	2	0	0	0	1	0	[illegible]	0	1	2
0	0	0	0	4	0	333.33	0	1	0	1	0	0	0	1	1	2	2
0	0	0	1	22	5	158.80	18	32	2	14	4	33	11	10	13	67	11

ending December 31.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
ADIRONDACK & NORTHERN DISTRICT:										
Totals....................	....	212	......	40	18.9	6	....	4	....	....
Argyle...........	3,700	3	9.78	0	....	0	0	0	0	0
Greenwich................	3,861	3	9.70	0	....	0	0	0	0	0
Salem	3,500	3	10.00	0	....	0	0	0	0	0
Fort Ann.........	4,267	1	3.00	0	....	0	0	0	0	0
Fort Edward...............	4,880	4	10.00	2	50.0	1	0	0	0	0
Glens Falls................	10,000	20	24.00	9	45.0	0	0	0	0	0
Port Henry	2,525	1	5.00	0	....	0	0	0	0	0
Malone....................	7,918	8	12.15	3	37.5	0	0	0	0	0
Potsdam....................	*4,000	5	15.00	2	40.0	1	0	0	0	0
OGDENSBURGH	*11,000	12	13.09	2	16.7	0	0	0	0	0
Ellisburgh..................	4,811	4	10.00	1	25.0	0	0	0	0	0
Plattsburgh................	*7,000	7	12.00	1	14.3	0	0	0	0	0
WATERTOWN	*12,200	21	20.50	4	19.0	0	0	0	0	0
Cape Vincent..............	3,143	1	4.00	0	....	0	0	0	0	0
Lowville	3,188	8	31.75	1	12.5	0	0	0	0	0
Rest of District............	....	111	......	15	13.2	4	0	4	0	0
MOHAWK VALLEY DIST.:										
Totals....................	....	371	......	79	21.4	4	....	5	....	....
SCHENECTADY..............	*20,000	33	19.80	12	36.4	1	0	0	0	0
Schoharie..................	3,350	11	39.35	4	37.3	0	0	1	0	0
Middleburgh...............	3,376	4	14.20	0	....	0	0	0	0	0
AMSTERDAM	*14,000	42	36.00	17	40.0	2	0	0	0	0
Johnstown.................	*6,000	8	16.00	1	12.5	0	0	0	0	0
Gloversville................	10,000	13	15.60	1	7.8	0	0	0	0	0
Little Falls.................	7,200	7	11.80	3	42.8	0	0	0	0	0
Ilion.......................	*4,200	3	8.57	0	....	0	0	0	0	0
UTICA.......................	*40,000	60	18.00	17	28.3	0	0	0	0	0
ROME....	12,045	18	18.00	4	22.2	0	0	0	0	0
Boonville..................	4,000	3	9.00	0	....	0	0	0	0	0
Camden....................	3,400	5	17.60	0	....	0	0	0	0	0
Waterford.................	4,326	6	16.63	1	16.7	0	0	0	0	0
Ballston Spa...............	3,200	7	26.25	3	28.5	0	0	0	0	0
Saratoga Springs..........	10,000	20	24.00	3	15.0	1	0	0	0	0
Rest of District...........	....	131	......	13	10.0	0	0	4	0	0
SOUTHERN TIER DIST.:										
Totals....................	....	217	......	32	14.6	1	....	8	1	....
BINGHAMTON	*25,000	31	14.80	7	22.6	1	0	1	1	0
Owego	6,000	3	6.00	2	66.6	0	0	0	0	0
Candor.....................	4,323	1	3.00	0	....	0	0	0	0	0
ELMIRA.....................	*25,000	36	17.28	6	16.6	0	0	2	0	0
Horseheads................	3,500	3	10.30	0	....	0	0	0	0	0
Hornellsville..............	10,000	3	3.60	2	66.6	0	0	0	0	0
Bath........................	3,500	3	10.30	0	....	0	0	0	0	0
Corning....................	*8,000	17	25.50	1	5.9	0	0	0	0	0
Olean......................	8,000	5	7.50	1	20.0	0	0	0	0	0
JAMESTOWN................	*14,000	24	20.57	4	16.6	0	0	2	0	0
Westfield..................	3,000	3	12.00	0	....	0	0	0	0	0
Rest of District............	....	88	......	9	9.6	1	0	3	0	0
EAST CENTRAL DIST.:										
Totals....................	....	315	......	77	24.4	1	....	5	2	....
Walton.....................	3,540	8	27.24	2	25.0	0	0	0	0	0
Delhi.......................	3,000	5	20.00	1	20.0	0	0	0	0	0

DECEMBER — *(Continued).*

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
6	....	1	....	19	1	170.00	14	23	2	8	7	16	23	6	6	50	20
0	0	0	0	0	0	......	1	0	0	0	1	0	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	1	0	1	0	0	1	0
0	0	0	0	0	0	......	0	2	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	......	1	1	0	0	0	1	0	0	0	0	0
6	0	0	0	2	0	400.00	1	1	1	0	3	2	3	0	0	0	1
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	......	1	1	0	1	0	1	0	0	0	2	2
0	0	0	0	1	0	......	1	0	0	0	0	0	1	0	0	0	1
0	0	1	0	1	1	250.00	0	2	0	0	1	1	2	1	0	1	1
0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	0	2	0
0	0	0	0	1	0	142.85	1	0	0	0	0	0	0	0	1	3	1
0	0	0	0	0	0	......	2	2	0	1	0	0	2	3	3	7	1
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	......	0	2	0	2	0	1	2	0	0	0	1
0	0	0	0	14	0	200.00	6	11	1	3	1	10	10	2	1	33	11
3	1	1	1	62	2	214.00	41	32	2	20	11	22	34	10	17	76	27
0	1	0	0	8	0	303.03	7	2	0	1	1	3	6	0	3	0	0
0	0	0	0	6	0	610.00	0	0	0	0	0	0	1	0	0	2	1
0	0	0	0	1	0	250.00	1	0	0	0	1	0	1	0	0	0	0
1	0	0	1	18	0	524.00	3	3	0	1	0	2	5	1	0	1	4
0	0	0	0	0	0	......	1	0	0	0	0	2	1	1	0	2	1
0	0	1	0	0	0	77.77	0	1	1	0	2	3	2	1	1	0	1
1	0	0	0	1	0	285.71	1	1	0	0	0	0	1	0	0	1	1
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	2	0
0	0	0	0	16	0	266.66	9	5	1	5	4	4	4	1	2	5	4
0	0	0	0	0	0	......	2	2	0	2	1	1	3	1	0	3	3
0	0	0	0	0	0	......	1	0	0	0	0	1	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	2	0	0	0	0	1	1	1
0	0	0	0	0	0	......	1	3	0	0	0	0	0	0	0	0	2
0	0	0	0	2	0	28.58	0	1	0	0	0	0	0	1	0	2	1
1	0	0	0	3	0	250.00	2	1	0	1	0	1	1	0	0	6	3
0	0	0	0	7	2	100.00	.13	13	0	7	2	5	9	4	10	50	5
....	1	2	....	17	1	145.00	23	19	2	18	8	22	30	7	12	31	14
0	0	0	0	1	0	96.78	7	5	0	0	1	5	2	0	3	0	5
0	0	0	0	2	0	666.66	0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	3	0	138.88	3	1	0	5	1	5	5	3	3	3	2
0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	2	0
0	0	0	0	2	0	666.66	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	1	0	2	0
0	0	0	0	4	1	294.00	3	2	0	0	1	2	0	0	0	2	2
0	0	0	0	2	0	400.00	0	0	0	0	0	0	1	0	0	0	2
0	1	0	0	3	0	250.00	3	1	0	5	2	2	2	0	2	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	3	0
0	0	2	0	0	0	68.18	6	10	2	7	3	8	20	3	4	17	2
3	8	2	....	31	5	183.20	35	31	6	19	7	25	36	3	18	63	15
0	0	0	0	0	0	......	0	1	0	0	1	0	2	0	1	2	1
0	0	0	0	0	0	......	0	1	0	0	0	2	1	0	1	0	0

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.
E. CEN. DIST.—(*Continued*).										
Cooperstown	*3,000	1	4.00	0	...	0	0	0	0	0
Oneonta	*5,000	12	28.80	9	75.0	0	0	0	0	0
Worcester	*3,000	6	24.00	3	50.0	0	0	0	0	0
Brookfield	3,685	5	16.22	0	....	0	0	0	0	0
Norwich	5,500	7	15.30	0	....	0	0	0	0	0
Hamilton	3,912	5	15.38	0	....	0	0	1	0	0
Skaneateles	4,866	2	5.00	2	100.0	0	0	0	0	0
SYRACUSE	*78,000	118	18.28	42	35.6	0	0	2	0	0
Cortland	4,361	2	5.00	1	50.0	0	0	0	0	0
Homer	3,000	4	16.00	1	25.0	0	0	0	0	0
Rest of District	....	140	......	16	11.4	1	0	2	2	0
WEST CENTRAL DIST.:										
Totals	....	206	......	85	12.0	2	....	5	....	....
AUBURN	*26,000	26	12.00	13	50.0	2	0	2	0	0
Groton	3,450	2	7.00	1	50.0	0	0	0	0	0
Ithaca	10,000	12	14.40	2	16.7	0	0	1	0	0
Waterloo	*4,500	3	8.00	0	....	0	0	0	0	0
Hector	5,000	4	9.60	0	....	0	0	0	0	0
Manchester	*4,000	1	3.00	0	...	0	0	0	0	0
Phelps	*7,000	5	8.57	0	....	0	0	1	0	0
Canandaigua	*6,300	6	11.50	0	....	0	0	0	0	0
Geneva	*6,000	6	12.00	0	....	0	0	0	0	0
Penn Yan	4,500	3	8.00	1	33.3	0	0	0	0	0
Le Roy	*5,000	3	7.20	0	....	0	0	0	0	0
Rest of District	....	135	......	18	13.3	0	0	1	0	0
LAKE ONT. & WEST. DIST:										
Totals	....	631	......	177	28.0	2	....	12	3	....
OSWEGO	*24,000	17	8.50	3	17.64	0	0	0	0	0
Richland	*4,000	5	15.00	1	20.0	0	0	0	0	0
Fulton	*4,000	5	15.00	1	25.0	0	0	0	0	0
Clyde	*3,000	2	8.00	0	....	0	0	1	0	0
Lyons	*6,000	8	14.00	0	....	0	0	0	1	0
Newark	3,500	7	24.00	0	....	0	0	0	0	0
Palmyra	*4,800	6	15.00	0	....	0	0	0	0	0
Wolcott	5,753	2	4.02	0	....	0	0	0	0	0
ROCHESTER	*110,000	160	17.45	44	27.5	0	0	3	1	0
Brockport	*4,500	2	6.24	0	....	0	0	0	0	0
Albion	5,000	11	26.40	1	9.2	0	0	0	0	0
LOCKPORT	*15,000	13	10.40	3	23.07	0	0	0	0	0
BUFFALO	*202,818	226†	19.36	92	40.7	2	0	6	1	0
Tonawanda	*4,900	13	31.25	5	38.5	0	0	0	0	0
Amherst	4,578	5	13.00	3	40.0	0	0	0	0	0
Rest of District	....	149	......	24	16.5	0	0	2	0	0
Totals for the State	....	7,886	......	2,497	....	36	....	104	78	12

† For three weeks

REMARKS.—The total reported mortality for the month is 7,886; of which 31.6 per
ratio of 190 per 1,000 total mortality. From diarrhœal diseases, the ratio per 1,000 is 9.85;
ratio for these three diseases, respectively, was 14.08, 14.73 and 87.37. Diphtheria is
from this disease. Scarlet fever is reported from 20 of the localities specified in the
Kings County Hospital at Flatbush, the town of Canarsie in Kings county, and from
cases have been reported during January from the town of Milo, Yates county (the
Peekskill, from Springwater, Livingston county, and from the town of Barton, Tioga
to be traced to New York or Brooklyn. From consumption the ratio of mortality is
from consumption, zymotic and puerperal diseases is 328.43 (336.00 in November). From

NOTE.—For boundaries of Sanitary Districts, see Annual Summary.

DECEMBER — (*Concluded*).

Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory syst'm.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	83.33	1	3	0	1	0	1	2	1	0	2	0
0	0	0	0	4	0	666.66	0	0	0	0	0	0	1	0	0	1	0
0	0	0	0	0	0	......	1	0	0	1	0	2	0	0	0	1	0
0	0	0	0	1	0	142.85	1	1	0	0	0	0	1	0	0	3	0
0	0	0	0	0	0	200.00	0	1	0	0	0	0	0	0	0	3	0
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	0	1
2	7	1	0	10	4	220.34	24	15	3	9	1	7	18	1	8	4	2
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	......	0	0	0	1	0	1	0	0	0	2	0
1	1	1	0	15	1	178.60	8	8	3	7	5	12	10	1	8	44	10
....	....	....	....	11	....	90.00	18	27	1	14	10	14	18	11	11	47	17
0	0	0	0	2	0	230.77	1	2	1	1	2	4	4	2	0	2	1
0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	0	0	1
0	0	0	0	3	0	333.33	0	0	0	1	0	0	0	2	1	3	1
0	0	0	0	0	0	......	0	0	0	1	0	0	1	0	0	1	0
0	0	0	0	1	0	250.00	1	0	0	0	0	0	0	0	1	1	0
0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	200.00	0	1	0	1	1	0	0	0	0	1	0
0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	1	4	0
0	0	0	0	0	0	......	0	2	0	1	0	0	1	0	0	2	0
0	0	0	0	0	0	......	0	0	0	1	1	0	0	0	0	1	0
0	0	0	0	1	0	333.33	0	0	0	1	0	0	0	0	0	1	0
0	0	0	0	4	0	33.33	16	21	0	7	6	10	11	7	8	30	14
9	3	2	3	68	5	170.00	52	80	2	36	20	38	89	21	26	77	83
0	0	0	0	1	0	58.80	2	2	0	2	2	0	1	2	2	1	2
0	0	0	0	1	0	200.00	0	0	0	0	0	0	0	0	0	3	1
0	0	0	0	2	0	400.00	1	0	0	0	0	1	0	0	0	0	1
0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	125.00	0	0	0	0	0	0	2	1	2	2	0
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	3	2	1
0	0	0	0	0	0	......	0	2	0	1	0	0	0	0	1	2	0
0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	1	0
0	0	1	0	22	0	168.70	17	26	0	8	9	14	32	2	4	8	13
0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	1	0
0	0	0	0	1	0	91.92	0	2	0	0	0	1	0	0	1	5	1
1	0	0	0	1	0	153.85	0	3	0	0	1	1	2	0	0	0	4
8	2	1	3	30	2	243.36	23	30	2	9	5	11	31	5	6	5	44
0	0	0	0	4	0	307.70	1	1	0	1	0	0	1	2	0	1	2
0	0	0	0	0	0	......	0	2	0	0	0	0	0	1	0	0	2
0	1	0	0	6	3	82.50	8	12	0	13	2	10	20	8	7	45	12
204	44	35	21	883	78	......	1,205	1,022	75	441	408	543	798	208	295	761	636

ending December 17.

cent were under five years of age. From zymotic diseases there were 1,500 deaths, a from typhoid fever, 13.19; from croup and diphtheria, 111.97. In December, 1886, the reported from 66 of the 124 specified localities; 59 per cent of the zymotic mortality is bulletin. From small-pox twelve deaths are reported, from New York, Brooklyn, the Albany; it appeared in Albany in December, where there are now six cases; and single origin of which is attributed to imported paper rags), from the town of Cortlandt near county; the latter originated in Potter county, Pennsylvania; the others probably are 129.61 per 1,000, and 190.00 per 1,000 above five years of age. The combined death ratio acute respiratory diseases, the death-rate per 1,000 is 152.82.

SUMMARY OF MORTALITY OF THE STATE OF NEW YORK, FOR THE YEAR 1887, AS PUBLISHED IN THE MONTHLY BULLETIN.

Totals of Mortality of the State by Months.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.
January	7,671	2,822	36.8	61	....	72	65	21	101	347	30	67	406
February	6,653	2,439	36.8	39	....	57	46	21	79	239	28	39	423
March	7,830	2,551	32.5	42	....	72	54	24	98	152	42	48	497
April	7,967	2,443	30.6	56	1	56	75	12	112	111	45	30	479
May	7,528	2,457	32.6	52	....	37	66	42	114	96	41	27	540
June	7,484	2,020	40.0	57	....	54	67	7	109	65	26	30	475
July	11,463	6,049	52.7	51	....	102	61	12	69	66	15	48	375
August	9,042	4,130	45.3	41	....	194	98	6	55	24	16	57	302
September	8,267	3,218	39.0	38	....	248	141	10	83	16	11	44	559
October	7,370	2,317	31.3	38	....	182	104	4	113	15	13	14	707
November	7,292	2,171	29.7	29	....	149	80	4	130	30	25	22	844
December	7,886	2,497	31.6	36	....	104	78	12	204	44	35	21	885
Totals for first six months	45,133	15,732	34.8	307	1	348	373	127	613	1,010	212	241	2,820
Totals for last six months	51,320	19,382	38.8	233	....	979	562	48	654	195	115	206	3,670
Totals for the year	96,453	35,114	36.3	540	1	1,327	935	175	1,267	1,205	327	447	6,490

SUMMARY OF MORTALITY, ETC. — *(Concluded)*.

	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
January	78	162.91	1,451	1,057	72	361	365	453	754	178	224	693	812
February	87	159.00	1,141	952	86	348	357	443	686	149	204	643	583
March	624	211.11	1,203	664	103	367	377	535	839	197	260	775	857
April	112	136.20	1,341	1,146	100	434	432	512	844	207	282	833	747
May	142	153.85	1,098	1,052	71	379	378	445	870	191	359	714	814
June	887	240.00	587	948	56	516	404	458	784	190	362	597	805
July	3,669	389.68	477	956	90	738	406	429	1,259	227	499	729	1,185
August	2,158	383.30	457	926	67	665	361	442	933	199	354	731	956
September	1,009	261.15	697	980	45	522	352	503	722	232	331	765	959
October	297	201.63	853	942	53	458	367	475	759	207	309	717	743
November	117	200.00	1,041	964	67	370	375	499	709	178	301	718	640
December	78	190.00	1,205	1,022	75	441	408	543	798	208	295	761	636
Totals for first six months	1,930	177.30	6,827	5,819	488	2,405	2,313	2,846	4,777	1,112	1,691	4,255	4,618
Totals for last six months	7,328	280.00	4,730	5,790	397	3,194	2,269	2,891	5,180	1,251	2,089	4,421	5,118
Totals for the year	9,258	228.00	11,557	11,609	885	5,599	4,582	5,737	9,957	2,363	3,780	8,676	9,736

TOTALS OF MORTALITY IN THE SEVERAL SANITARY DISTRICTS FOR THE YEAR.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.
Maritime District	61,715	25,289	41.0	232	1	528	658	171	933	988	217	283	4,654
Hudson Valley District	9,896	2,864	29.0	136	....	270	79	4	109	49	25	41	579
Adirondack and Northern District	2,969	710	24.0	36	....	71	11	......	28	16	19	20	147
Mohawk Valley District	4,359	1,089	25.0	33	....	89	14	......	32	25	8	21	294
Southern Tier District	2,513	580	23.2	19	....	76	33	......	24	6	11	8	111
East Central District	3,465	765	22.8	12	....	71	40	......	17	17	12	28	106
West Central District	2,474	457	18.5	8	....	47	24	......	......	4	12	11	76
Lake Ontario and Western District	9,065	3,870	37.0	65	....	175	70	......	124	100	23	35	528

TOTALS OF MORTALITY IN THE SEVERAL SANITARY DISTRICTS FOR THE YEAR — *(Concluded)*.

	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
Maritime District	6,501	245.80	8,512	7,546	560	3,457	3,480	3,197	6,102	1,317	2,289	3,437	6,652
Hudson Valley District	706	201.20	946	1,331	107	642	326	957	955	233	413	1,187	801
Adirondack and Northern District	189	179.50	236	366	32	169	79	182	253	112	109	626	268
Mohawk Valley District	321	192.00	364	485	33	274	156	319	474	165	173	712	367
Southern Tier District	178	186.00	233	236	31	175	57	169	292	74	140	415	225
East Central District	196	144.00	324	410	47	193	123	274	376	107	166	730	216
West Central District	144	131.40	192	285	23	149	94	162	256	94	101	594	198
Lake Ontario and Western District	1,018	237.50	750	950	52	540	267	479	1,249	259	8	975	1,017

SUMMARY OF MORTALITY.

	FROM TYPHOID FEVER.			FROM DIARRHŒAL DISEASES.			FROM DIPHTHERIA.			FROM CONSUMPTION.		
	1885.	1886.	1887.	1885.	1886.	1887.	1885.	1886.	1887.	1885.	1886.	1887.
In each 1,000 deaths there were in the—												
Maritime District	8.87	8.41	8.55	106.00	91.31	107.00	58.28	71.43	75.40	143.58	140.52	121.80
Hudson Valley District	27.85	27.28	27.27	62.63	63.48	71.30	64.87	61.93	58.50	144.83	137.00	134.85
Adirondack and Northern District	19.35	20.58	24.00	46.54	58.06	63.00	72.08	43.35	49.00	147.82	137.90	122.00
Mohawk Valley District	19.53	21.91	20.45	57.65	53.93	73.60	44.74	36.80	67.40	143.67	132.30	111.25
Southern Tier District	23.55	26.00	30.40	55.70	59.88	71.20	27.57	41.03	44.40	114.25	100.95	94.40
East Central District	19.64	27.45	20.50	59.74	51.20	56.60	32.74	40.34	30.60	139.93	131.52	118.40
West Central District	24.78	20.42	19.00	49.67	54.47	58.30	22.63	20.42	20.80	155.08	141.08	115.40
Lake Ontario and Western District	20.85	19.18	19.45	60.00	80.27	113.10	49.53	58.25	58.67	130.00	125.77	105.55
The entire State	13.27	13.47	13.75	90.80	80.97	96.00	56.06	64.48	67.24	139.76	137.66	120.35

REMARKS.—The Sanitary Districts into which the State is divided are as follows: Maritime (population in 1880, 2,098,589; present estimated city population 2,280,000): Includes New York, Long Island, Staten Island and Westchester county. Hudson Valley (population in 1880, 750,143; present estimated city population, 250,000): All the counties on either side of the Hudson river except Westchester, to and including Albany and Rensselaer. Adirondack and Northern (population in 1880, 330,434; present estimated city population, 23,200): The northern section of the State—the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. Mohawk Valley (population in 1880, 280,809; present estimated city population, 80,000): Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties. Southern Tier (population in 1880, 365,746; present estimated city population, 60,000): The seven counties along the southern border of the State. East Central (population in 1880, 354,320; present estimated city population, 78,000): Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. West Central (population in 1880, 321,247; present estimated city population, 26,000): Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. Lake Ontario and Western (population in 1880 (578,705; present estimated city population, 350,000; Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties. No census of the State has been taken since 1880; the population may be estimated at about 5,500,000.

The average death-rate of eighty-seven regularly reporting localities is 23.00 per 1,000 population, their population aggregating 3,500,000, all of the twenty-seven cities, except three of the smaller ones, being included. The average death-rate of sixty-three localities, ranging in population from 3,000 to 13,000, the total being about 375,000, was 18.40 per 1,000 population for the year; 28.5 per cent were under five years of age. At a death-rate of 18.40 per 1,000 the total deaths in the State for the year would be 101,200. Besides the 96,453 deaths noted above a considerable number of returns are received too late to be included in the monthly issues of the bulletin.

From zymotic diseases the ratio per 1,000 total mortality was 227.80 in 1887, against 217.23 in 1886, 222.17 in 1885 and 269.12 in 1884. The death-rate from diarrhœal diseases was unusually high, as shown by one of the above tables; that of diphtheria was also increased. The mortality from scarlet fever was 13.14 per 1,000; in 1886 it was 11,65. Measles had a large death-rate in the early months of the year, its increase in prevalence having begun in November, 1886. Small-pox during the year existed only in the Maritime District save a limited outbreak in January in Albany, where it has reappeared in December; other sporadic cases are reported elsewhere in the State at the beginning of 1888. Besides these there was no exceptional prevalence of other zymotic diseases during 1887.